Managing Environmental Sustainability in the European Food & Drink Industries
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Food and the environment

Food and drink products play a central and fundamental role in daily life. Every day, some 480 million EU citizens rely on high-quality food for their nutrition, health and well-being. Food and drink products relate to their life-style and reflect their cultural identity.

The food and drink industry is fully aware that the production and consumption of its products (from farm to fork and beyond) also triggers environmental implications. To ensure long-term sustainability, the common objective of European food and drink manufacturers is continuously to improve the environmental performance of their products and processes, while meeting consumers’ needs for food safety, nutrition, health, convenience, life-style and product choice.

For many years, food and drink companies have shown leadership in environmental sustainability. This includes voluntarily cutting energy use, water consumption and waste generation, increasing resource-efficiency and engaging in a range of initiatives with food chain partners.

Environmental sustainability has inherent benefits for the industry: First, it is the natural environment where the sector’s raw materials are grown. It forms the basis for the long-term health and prosperity of the sector. Environmental sustainability also enables companies to remain competitive by reducing resource use and costs. There is a strong business case for efficient management of natural resources. Not least, the industry is fully aware of its social responsibility and is committed to making a positive contribution to society and the natural environment.

The objectives of this publication

An important element of CIAA’s work on sustainability is to share key environmental issues with internal and external stakeholders. This publication builds on the CIAA Environment Review 2004. Its first objective is to invite all stakeholders inside and outside the food chain to join in common debate and intensified co-operative action, with a view to demonstrating collective responsibility as the key to sustainability - and as a positive alternative and complement to regulation.

The second objective is to show all food and drink manufacturers the commercial, financial and environmental benefits of the sustainability agenda. Competitive and cost pressures are key drivers of sustainable development in the industry. Today, many food and drink companies are delivering excellent achievements. Raising the profile of sustainability for the entire sector requires all manufacturers to raise their game.

The structure of this publication is threefold:

- First, it gives a structured overview of the main environmental challenges affecting the food sector along the life-cycle of its products.
- Second, it illustrates food and drink companies’ strategies, actions and achievements.
- Finally, it looks ahead and identifies priority areas for further action by all stakeholders.

The European food and drink industry sincerely hopes that this publication will serve as a constructive basis for future debate and cooperative action to achieve our common objective of ensuring long-term sustainability in food and drink production and consumption.
The life-cycle of food and drink products

Agriculture
- Soil
- Water
- Animal feed
- Agro-chemicals
- Pesticides
- Herbicides
- Energy

Food manufacturing
- Water
- Energy
- Preservatives
- Additives
- Refrigerants
- Packaging materials

Resources & Waste
- Soil loss
- Polluted runoff
- Greenhouse gases
- Wastewater
- Organic wastes
- Habitat loss
- Eutrophication

Energy & Climate

Water

Packaging

Waste water
- Solid wastes
- Greenhouse gases
- Air emissions
Transport
- Fuels
- Oils
- Refrigerants
- Greenhouse gases
- Air emissions

Retail and Distribution
- Energy
- Refrigerants
- Packaging
- Fuels
- Greenhouse gases
- Air emissions
- Solid wastes

Households and Food services
- Water
- Energy
- Refrigerants
- Packaging
- Waste water
- Greenhouse gases
- Air emissions
- Food waste
- Packaging waste
Introduction

1. Shared responsibility across and beyond the food chain

The food chain comprises many different stages and players, including farmers, industry, suppliers, transport, retailers, consumers and waste managers, all of whom generate different environmental impacts. A meaningful strategy towards sustainable production and consumption in the food chain requires integrated involvement of all life-cycle stages and players. Every player in the chain has a crucial role to play, individually but also as a team player.

The food industry’s direct sphere of influence is in purchasing agricultural raw materials and processing them into high quality food and drink products. Therefore, the main focus of this communication is on the manufacturing stage, covering energy use and greenhouse gas emissions, resource and waste management, water and waste water management, as well as packaging.

However, important environmental impacts occur upstream and downstream of the processing stage, where a range of other players have their own distinct spheres of influence and responsibility. The relationships between these players are complex. For instance, the food and drink industry is not directly involved in farming. However, it purchases about 70% of EU agricultural produce. Cooperation between farmers, industry and others is vital to ensure sustainable development in the production of raw materials for the entire food chain. The same applies to others in the chain, including transport, retailers and consumers. They all take their own decisions which influence the food chain’s overall performance, but they operate outside the direct control of food companies.

2. Key areas for current and future action

Continuous improvement through cooperative action

There is no such thing as a single, exclusive tool to ensure sustainability in the food chain. The high heterogeneity of food and drink products and processes, the wide range of environmental implications, and the diversity of players in the food chain, requires a broad range of continuous and multi-faceted measures that affect all contributors. Some are taken by individual players, others involve cooperation between several players or indeed the entire food chain. Some are production-related, others consumer-related. Some foster short and mid-term objectives, others require long-term strategies.

Sustainable Production: Innovating processes and products

Spreading best practice

In numerous cases, short and mid-term objectives can be successfully fostered via the proliferation of existing best practice and technology at all stages of the food chain. In food manufacturing, particular attention has to be paid to reaching SMEs (small and medium enterprises), which account for 99% of all food and drink companies in the EU (totalling 279,000). Trade associations are playing an active role in supporting, sharing and encouraging the spread of best practice, but it is often more difficult for them to reach SMEs. It is crucial that national and local authorities and agencies target their support programmes and incentives to help SMEs to overcome barriers in terms of financial and human resources.

R&D and innovation

Innovation plays a crucial role in ensuring long-term sustainability. Technological development can be expected to deliver significant further improvements in areas such as energy use, greenhouse gases and resource efficiency. Meeting long-term sustainability targets will require further focus on R&D and investment and increased cooperation among all stakeholders. R&D efforts should be coordinated and prioritised, and the results made available across all sectors. The industry is
committed to work closely with authorities and researchers to align R&D with business needs and to implement the results of beneficial R&D. Particular attention must be paid to improving the commercial competitiveness of emerging technologies.

**Sustainable Consumption: Reducing impacts through environmental education**

**Consumers’ own impacts**
Consumers generate significant direct environmental impacts through the way they transport, store and prepare food, as well as the amount of waste they generate, and how they dispose of it. Intensified environmental education will be vital to raise consumer awareness of the sustainability impacts of their behaviour and decisions.

**Consumer information**
Consumers also indirectly influence impacts upstream in the supply chain through their purchasing decisions. Reliable environmental information is an important tool to enable consumers to make informed choices and to follow their individual preferences. With this in mind, the food and drink industry is engaged in a number of concrete initiatives to evaluate the feasibility of a uniform and meaningful environmental assessment methodology for food and drink products, to evaluate related costs and benefits and to explore suitable communication tools.

**Improving the knowledge-base**
Countless food and drink companies are monitoring their own environmental performance as part of their internal improvement process, and communicate their performance to the outside world as part of their corporate social responsibility commitment.

The most complete environmental data is available from large food and drink companies, which account for about 50% of the sector’s turnover in the EU. Due to the extremely high number of SMEs in the sector and their exceptionally wide variety of products and processes, the measurement and monitoring of their resource consumption and environmental impacts has proved to be particularly difficult, especially at an aggregate, EU-27 level. On the basis of available sector, national and company data sources, the food and drink industry is making significant efforts to consolidate environmental data and monitor trends, identify priorities, and develop and implement relevant sustainability strategies.

Combined efforts by industry, public authorities, environmental agencies and the European research community have considerable potential to further improve the knowledge-base in areas where relevant data is still incomplete or insufficiently robust. Establishing a reliable knowledge-base not only supports industry in further refining its own sustainability strategies, it is also vital for ensuring science-based policy-making and better regulation.

**3. Reaching out to stakeholders**

This publication illustrates that the food and drink industry has made a significant contribution to environmental sustainability. The industry is justifiably proud of its efforts. That said, there is absolutely no room for complacency. There is still much to do. Long-term sustainability along the food chain requires continuous improvement and innovation across the entire sector based on the responsibility and cooperation of all food chain players.

The food and drink industry is firmly committed to continue and further intensify its cooperation with all business partners, public authorities and other stakeholders. For this purpose, this publication not only addresses existing challenges and industry action, but also highlights areas for closer future cooperation by all players. However, the identified issues are not exclusive and should serve as the basis for extensive future debate. They should encourage all stakeholders inside and outside the food chain to contribute their views, strategies and expectations.

The CIAA welcomes comment and debate and is ready and willing to have meaningful dialogue with all those who respond to the issues outlined in this publication. The industry looks forward to even greater cooperation to help build momentum and make an even bigger contribution to environmental sustainability.
Setting the scene  Environmental sustainability across the food chain

Our raw materials
- Farming systems are the start-point of the food chain. The EU food and drink industry purchases about 70% of EU agricultural produce. It is therefore crucial for the long-term health and prosperity of the industry that farming systems are sustainable.

- While agriculture accounts for a notable part of the environmental impacts of the food chain, including impacts on water, air, climate and bio-diversity, farming systems - if managed sustainably - can also benefit the environment in many ways.

- The food and drink industry, although not directly involved in farming activities, is engaged in a series of concrete initiatives to support sustainable agriculture in the EU and globally. The industry promotes a holistic approach to sustainable agriculture aimed at securing safe food supplies, both in quality and quantity, protecting the natural environment and improving the socio-economic conditions of local communities.

Resource efficiency and waste management
- Raw materials used in the food and drink industry are of agricultural origin. Food and drink manufacturers are increasingly acting as bio-refineries, in which agricultural raw materials are separated into a long series of products, comprising not only food but also feed, fertilisers, cosmetics, bio-fuels and others.

- Full raw material utilisation in the food sector increases resource-efficiency and productivity, reduces bio-degradable waste and supports the transition to a bio-based economy (use of renewable resources).

- For remaining waste, manufacturers implement recycling and recovery to reclaim the resources embedded in waste and to minimise waste going to final disposal.

Energy and climate change
- The food and drink industry accounts for about 1.5% of total greenhouse gas (GHG) emissions in the EU-15. Direct GHG emissions fell by 3% from 2004 to 2005 and CO2-intensity relative to economic growth has fallen by 25% since 1990.

- Within the food chain, agriculture accounts for 49% of GHG emissions, followed by consumers with 18% and manufacturing with 11%.

- Countless food and drink companies are showing genuine leadership in energy and carbon management. This includes voluntarily cutting energy use, fuel switching, investing in energy efficient and low carbon technologies, participating in national or sector energy efficiency schemes, detailed energy audits and feasibility studies.

Water
- Access to fresh water is critical for the food and drink industry, both in terms of quantity and quality. Clean water is not only a prerequisite for agricultural sustainability, it is also an important product, a main ingredient and key processing element.

- The challenge for the industry is two-fold: First, continuously reduce water consumption in its own processes by improving water efficiency without compromising strict EU food hygiene requirements.

- Second, promote the responsible use of water and maintain sustainable water supplies throughout the food chain, including agriculture.

Packaging
- As a major user of packaging, the food and drink industry fully recognises its responsibility to reduce the environmental impact of packaging along the life-cycle.

- At the same time, packaging is essential to ensure food safety and product quality. By avoiding food waste, packaging also protects the environment.

- Packaging recycling and recovery is highly successful in the EU. The amount of packaging waste sent for disposal fell by more than 20% between 1997 and 2004.

- Sociological trends and changes in life-styles are driving significant changes in the demand for packaged goods. The key challenge lies in the reduction of packaging material, without compromising food integrity, quality and safety, and in ensuring sound recycling and recovery of packaging waste.
Transport and distribution

- Transport impact is overwhelmingly in the areas of road congestion, damage to infrastructure and road accidents. There are also impacts on greenhouse gas emissions, air and noise pollution.

- Following the general trend, the food and drink industry has experienced an increase in transport operations over the past decades. This is driven by structural changes affecting global supply chains, including a shift towards fewer, more efficient production plants and distribution centres, as well as “just-in-time” delivery.

- The food and drink industry exists to provide consumers with a wide choice of food products, and in this context considers that locally processed products are complemented by products that are processed at longer distances.

- The industry pursues a range of initiatives to optimise transport efficiency and sustainability, such as inter-modality, lowering impacts of individual modes, investing in new technologies and cooperating with key supply chain partners.

Consumers

- Consumers generate direct environmental impact through the way they transport, store and prepare food, how much waste they generate, and how they dispose of it. Recent figures show that up to 20-30% of food is wasted in households, losing all resource inputs used for its production.

- Consumers also indirectly influence environmental impacts occurring upstream in the supply chain through their purchasing decisions. Consumer demand for different food products has changed in important ways over the last 30 years, driven by increasing per capita incomes, demographic shifts, and life-style changes (e.g. more prepared and convenience food, smaller packaging sizes). These changes also affect the environmental characteristics of food products.

- Consumption-related measures can help consumers reduce their own environmental impacts by raising their awareness of the consequences of their actions. Measures can also make it easier for consumers to reduce energy and water consumption and to contribute to waste prevention and recovery. Environmental information and education can encourage consumers to consider environmental implications across the food chain.

Public authorities

Public authorities influence the life-cycle of food products not only through their regulatory activity, but also through their practical role as providers of infrastructure services, such as road and rail connections, water supply and waste management.
Our raw materials
Sustainability at the start of the food chain

THE ISSUE

- Farming systems are the start-point of the food chain. The EU food and drink industry purchases about 70% of EU agricultural produce. It is therefore crucial for the long-term health and prosperity of the food and drink industry that farming systems are sustainable.

- While agriculture accounts for a notable part of the environmental impacts of the food chain, farming systems - if managed sustainably - can also benefit the environment in many ways.

- The food and drink industry, although not directly involved in farming, is engaged in a series of concrete initiatives to support sustainable agricultural practices in the EU and globally.

- The industry promotes a holistic approach to sustainable agriculture aimed at securing safe food supplies, both in quality and quantity, protecting the natural environment and improving socio-economic conditions of local communities.
Farming systems are the start point of the food chain. Whereas the food and drink industry is not directly involved in farming activities, it purchases about 70% of EU agricultural produce. For the long-term health and prosperity of the industry, it is therefore crucial that agricultural production systems are sustainable.

The three elements of sustainable farming

Environmental dimension
Preserving natural resources, protecting and, wherever possible, improving eco-systems are corner-stones of all sustainable farming systems.
- Responsible cultivation practices contribute to preserving soil fertility and to preventing soil erosion, pollution, salinisation and loss of arable land and bio-diversity.
- Responsible and limited use of water helps to conserve water quantity and quality.
- Energy-efficiency and the reduction of greenhouse gases and other emissions are crucial for reducing air pollution and mitigating global warming.
- Animal welfare must be ensured along the food chain.

Social dimension
Sustainable agriculture requires essential social aspects to be taken into account. National, EU and international regulations must be respected. Working and living conditions for farmers, farm-dependent employees and their families, as well as opportunities for developing their skills and capabilities, should be improved over time. Freedom of association has to be respected.

Economic dimension
To enable viable livelihoods to be made from farming activity, sustainable agricultural production should be market-driven and respond to consumer demand.
European food and drink manufacturers are involved in a range of concrete initiatives worldwide to support and stimulate sustainable agricultural practices beyond legal requirements.

Examples of industry involvement in sustainable agriculture

The food and drink industry is involved in a series of agricultural initiatives worldwide, which are characterised by a high diversity of partners, concepts and tools. None of these initiatives claims to provide a single, exclusive approach to sustainable agriculture. Stakeholders are engaged in permanent dialogue about the merits and future development of the various initiatives, and continuous progress is being made through constant "reality-checks" and mutual benchmarking with other schemes. The initiatives shown below - together with many others - share the common objective of contributing to improved sustainability.

**Sustainable Agriculture Initiative (SAI) Platform**

SAI Platform was created in 2002 by Unilever, Danone and Nestlé to support the development of sustainable agriculture worldwide, involving different stakeholders in the food chain. The Platform, which today includes 21 major food companies, has a holistic vision of sustainable agriculture, embodying economic, social and environmental elements. SAI working areas include cereals, coffee, vegetables, fruit and dairy.

**SAI Working Group on Dairy**

The world’s cattle population provides a wide array of services to people, including milk, dairy products and meat. It also creates labour. To ensure the positive development of the dairy sector, a number of challenges lie ahead. The SAI Working Group on Dairy aims to help meet these by maintaining food safety and quality of dairy products; improving farms’ economic viability and social progress; and increasing environmental protection and animal welfare. The Group has developed Sustainable Dairy Principles and Practices on the basis of the International Dairy Federation (IDF) and FAO “Guide to good dairy farming practice”. These are now being tested in a number of pilot projects worldwide, and benchmarked against other major schemes and initiatives.

**Roundtable on Sustainable Palm Oil (RSPO)**

RSPO is a global stakeholder initiative created in 2004 to promote the growth and use of sustainable palm oil. Participants include growers, processors, traders, retailers, banks, NGOs and manufacturers, such as Nestlé, Unilever, Cadbury Schweppes, Ferrero and Heinz. Its work is centred on the Principles and Criteria for Sustainable Palm Oil Production. A separate Roundtable on Sustainable Soy was created in 2005.
World Cocoa Foundation (WCF)

WCF was formed in 2000 to promote economic and social development as well as environmental conservation in cocoa growing communities. Today, it plays a leading role in developing and managing effective, on-the-ground programmes, raising funds, and acting as a forum for discussion of the cocoa farming sector's needs. The WCF comprises nearly 60 member companies, including Ferrero, Kraft, Nestlé and Cargill.

Common Code for the Coffee Community (4C) Association

The 4C Association is a multi-stakeholder association, comprising coffee producers, trade, industry and NGOs. 4C aims to improve producers' income and living conditions via cost reductions, quality improvements, improved marketing conditions and environmental sustainability (e.g., reducing the use of agro-chemicals and protecting tropical rainforests). Trade and industry members commit themselves to buying rising amounts of 4C coffee over time, and to financing verification costs. Industry members include, among others, the European, German, UK and Norwegian Coffee Federations, Tchibo, Sara Lee, Nestlé and Kraft Foods.

UTZ Certified

UTZ is another worldwide coffee programme based on the UTZ Certified Code of Conduct. It sets out social and environmental criteria for responsible coffee growing practices and efficient farm management. Independent certifiers conduct annual inspections to ensure producers comply with the Code.

Vegaplan Belgium

Vegaplan is an example of a national agricultural scheme. This Belgian certification scheme supports sustainable farming and chain management in arable crops. The scheme is based on the ICQM Standard (Integrated Chain Quality Management), which covers food safety, traceability, environment and technological quality, and comprises all links in the chain “from farm to fork” - including food manufacturers.

Sustainable Beet Growing Board

The Board was founded about 30 years ago on the initiative of the Südzucker company and beet growers’ associations with the aim of improving agricultural practices in beet growing. Major achievements include a 50% reduction in mineral-N-fertiliser usage and a 90% reduction in pesticide usage for seed protection. The development and broad application of new approaches in weed control and leaf disease treatment.

The Rainforest Alliance

The Rainforest Alliance is an international environment organisation with more than 20 years' experience in the development and promotion of sustainable standards in forestry, agriculture and tourism. Rainforest Alliance’s standards cover safe and fair working conditions, environmental protection and economic sustainability. The organisation supports farmers in making improvements in sustainability and is working with food companies such as Kraft Foods, Unilever and Nestlé.

"The industry promotes a holistic approach to sustainable agriculture aimed at securing safe food supplies, both in quality and quantity, protecting the natural environment and improving socio-economic conditions of local communities."
Building on achievements

Looking ahead, a major objective is continuously to broaden participation of food and drink companies in sustainable agriculture initiatives. This will not only result in increased environmental benefits, but will also strengthen the administrative structures required for defining, implementing and verifying sustainable farming practices worldwide. In addition to widening participation, agricultural initiatives are improving over time due to continuous reality checks and mutual benchmarking and stimulation. This ongoing process also brings with it an increasing number of sustainable sourcing commitments by individual food industry players.

To be sustainable, agricultural production has to respond to consumers’ needs. Food and drink manufacturers are continuing to extend the integration of sustainability aspects in their sourcing practices in line with rising consumer demand for products complying with specified criteria. Agricultural and rural policies should support this process by encouraging sustainable farming practices and offering a framework in which public and private initiatives that go beyond regulation, can flourish.

Unilever commits to source all its tea sustainably by 2015

In May 2007, Unilever - the world’s largest tea company - announced its commitment to purchase all its tea from sustainable sources. It has asked the Rainforest Alliance to start certifying tea estates in Africa. Since then, Unilever has launched the first Rainforest Alliance Certified Lipton Kericho Estate Tea in the UK. The plan is to have all Lipton Yellow Label tea bags sold in Western Europe certified by 2010; and all Lipton tea bags sold globally certified by 2015.

Kraft Foods: A new approach to marketing sustainably produced coffee

In a move to advance the availability of certified sustainable coffees in the mainstream market, Kraft launched a partnership in October 2003 with the Rainforest Alliance. Kraft is the largest buyer of Rainforest Alliance coffee beans worldwide. In 2006, Kraft purchased about 12,000 tons of coffee from Rainforest Alliance Certified Farms. This is three times the amount Kraft purchased in 2003 when it began working with the Rainforest Alliance. Kraft is blending this certified coffee into several of its mainstream coffee brands in western Europe. In 2005, Kraft launched its first 100% Rainforest Alliance Certified retail brands in France, Sweden, Italy and the United Kingdom.

Nespresso AAA Sustainable Quality Programme

In 2006, Nespresso signed a Memorandum of Understanding with all its main coffee suppliers, committing all parties to sourcing green coffee according to defined sustainability and quality criteria. The criteria are based on the Tool for the Assessment of Sustainable Quality (TASQ), which Nespresso is implementing in cooperation with the Rainforest Alliance. The TASQ covers a range of aspects such as strain of coffee plant, soil type, harvesting practices, environmental aspects including use of fertilisers, biodiversity and water conservation, but also social practices and economic issues.
Widening participation in sustainable agriculture initiatives will not only result in increased environmental benefits, but will also strengthen the administrative structures required for defining, implementing and verifying sustainable farming practices worldwide."
Resource efficiency & waste management

Making the most of our raw materials

THE ISSUE

- Resources used in the food and drink sector are of agricultural origin. Due to their biological nature, virtually every part of an agricultural crop has a useful application. There is both an imperative and an immense potential to use these resources in a highly efficient manner.

- The declared objective of the food industry is to use 100% of agricultural resources wherever possible and, in so doing, to reduce waste to the absolute minimum by transforming them into a wide range of products, including co-products and by-products. Food and drink manufacturers are increasingly acting as bio-refineries, in which agricultural resources are separated into different components, each of which finds useful applications including animal feed, fertilisers, cosmetics, pharmaceuticals, bio-plastics and bio-fuels.

- While food companies are fully committed to source reduction, some waste is unavoidable and food companies progressively implement sustainable recycling and recovery methods to reclaim resources embedded in waste, and minimise waste going to landfill, in particular as far as bio-degradable waste fractions are concerned.
The challenge

The way in which renewable and non-renewable resources are used in many parts of the world risks eroding the planet’s capacity to regenerate these resources. Globally, this trend is further exacerbated by increasing demand for raw materials from emerging economies such as China, India and Brazil.

To ensure more sustainable resource use, it is essential to improve resource efficiency and reduce environmental impact while ensuring continued economic growth (decoupling). Resource efficiency is also a crucial driver for waste prevention, one of the key objectives of the 6th EU Environmental Action Programme. Where waste generation cannot be prevented, it is imperative to ensure its sustainable management and to recover its embedded resources in the most efficient manner.

Food and drink industry initiatives

I. Aiming for full raw material utilisation - The key to waste prevention

Besides its core products, the EU food and drink industry produces many additional products that are used in a wide range of different economic applications, ranging from animal feed to fertilisers, cosmetics, pharmaceuticals, lubricants, bio-plastics, bio-fuels and others.

These products are subject to intensive product-related legislation and offer significant environmental and economic benefits. They improve resource efficiency in industry, helping to reduce agricultural pressures on the environment. They also generate higher added value from a given unit of agricultural input (stimulating economic growth).

In addition, they contribute significantly to waste prevention by avoiding unnecessary wastage of natural resources. Finally, products and by-products from the food and drink sector support the important transition towards a bio-based, low carbon economy (use of renewable resources).

Example 1: Animal feed

Animal feed is the most important use of by-products from the food sector in terms of volume. Each year, about 85 million tonnes of by-products are used for animal feeding (e.g. sugar beet pulp, maize gluten, brewers’ grains, whey). 60 million tonnes are used by the EU compound feed industry, while the rest is supplied directly to farmers. The use of these products in animal feed is extensively regulated in EU legislation, including Regulation 178/2002 on food law and Directive 96/25/EC on the circulation and use of feed material.

a) Sugar beet

The European sugar industry processes some 110 million tonnes of beet every year, producing 17 million tonnes of sugar. However, sugar represents only about 16% of fresh sugar beet weight, and a considerable number of other products are produced, all of which meet legislation, specifications and quality controls.

Towards 100% efficiency in the sugar sector: Products and by-products from 1 unit of sugar beet

Source: CEFS

The leading non-sugar product is beet pulp, an excellent and long-recognised cattle feed product which is highly appreciated by farmers for its pure plant origin and high energy value. Beet pulp originates from cleaned, sliced sugar beet (known as “cossettes”) when the sugar is dissolved with warm water. The annual production of beet pulp in the EU amounts to around 8 million tonnes of pressed pulp and 5.5 million tonnes of dried pulp.
b) Oilseed crushing
The extraction of oil from soybeans, rape-seeds, sunflower seeds and other oilseeds generates yearly around 18.6 million tonnes of oilseed meal, a product that is extremely concentrated in high nutritional value proteins. Oilseed meals are an essential source of protein for the EU livestock population, regardless of species.

Example 2: Bio-energy production
Due to the agricultural origin of the raw materials used in the food and drink sector, many by-products are suitable for use as a CO2-neutral, renewable energy source.

a) By-products from oilseed processing
Oilseed processing generates oils, meal and fatty acids. Both meals and fatty acids have a high energy content. Fatty acids are an ideal, CO2-neutral bio-fuel. Its energy content is almost comparable with that of mineral fuels, while its fluidity brings about the same logistic advantages. The European oilseed processing industry produces approximately 550,000 tonnes of fatty acids each year that can be used for heat and power generation.

b) Bio-gas production
Many by-products from food and drink manufacturing can be transformed into bio-gas via anaerobic digestion in bio-reactors. This technique is increasingly combined with combined heat and power generation (CHP), with the produced heat used 100% in the internal production process, and remaining electricity sold to the national grid as renewable energy.

c) Coffee by-products
Coffee chaff from coffee roasting and spent coffee grounds from soluble coffee manufacturing can also be used as CO2-neutral fuels. For instance, spent coffee grounds from soluble coffee production can be burned as renewable fuel to provide steam for other production stages, replacing fossil fuels and reducing CO2 emissions.

Example 3: Fertilisers
Several by-products from food manufacturing can be used as bio-fertilisers adding nutritional value to soil. Sugar factory lime, for instance, is recognised as a fertiliser under the EU’s regulation on organic agricultural production. In addition to lime (calcium carbonate), it also contains other valuable nutrients such as magnesium, phosphate and potassium, and is used to improve soil structure and reduce acidity. In this way, the sugar industry makes a valuable contribution to environmental efficiency by providing farmers with a sustainable product that avoids extraction of limited limestone reserves.

Example 4: Other applications
Growing awareness of the environmental impact of petro-based products, and the recent insecurity of oil supply, has focused attention on the advantages of bio-based products and raw materials from the food and drink sector, which are increasingly used to produce plastics, lubricants, detergents, ink, cosmetics and pharmaceuticals.

Regulatory barriers to full raw material utilisation
By-products and waste
The current lack of legal clarity under EU legislation regarding the distinction between waste and non-waste can hinder the efficient use of by-products, especially when national authorities, often over-burdened with legal ambiguities, wrongly classify by-products as “waste”. This situation poses a threat to the objective of improved resource efficiency, industrial productivity, waste prevention and increased use of renewable resources.

Integrated Resource and Waste Management (IRWM)
In 2004, CIAA launched the IRWM platform together with many other EU stakeholders from the food and feed chains. The forum developed clear criteria to distinguish between products and waste in the food and drink sector. These criteria also reflect recent jurisprudence of the European Court of Justice on by-products. To allow the full benefits of by-products to be realised, these principles need to be translated into clear EU legislation, confirming their status as non-waste.
Overview of the criteria to distinguish between by-products and waste

<table>
<thead>
<tr>
<th>Legal classification</th>
<th>By-product (non-waste)</th>
<th>Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability</td>
<td>Suitable for direct further use in a production process or as final product</td>
<td>Not suitable for direct further use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May be used as secondary raw material after recycling or recovery</td>
</tr>
<tr>
<td>Intention of the holder</td>
<td>Intention to exploit or market the material</td>
<td>Intention to discard the material</td>
</tr>
<tr>
<td>Certainty of use</td>
<td>Further use is certain</td>
<td>Discarding takes place</td>
</tr>
<tr>
<td>Legislation</td>
<td>Further use in compliance with all relevant product, environmental and health protection requirements for the specific further use</td>
<td>Waste management (e.g. recycling recovery, disposal) in compliance with waste legislation</td>
</tr>
<tr>
<td>Example</td>
<td>Bio-based by-products from food manufacturing used in:</td>
<td>The following items if no longer used:</td>
</tr>
<tr>
<td></td>
<td>■ Animal feed</td>
<td>■ Pallets</td>
</tr>
<tr>
<td></td>
<td>■ Fertilisers</td>
<td>■ Crates</td>
</tr>
<tr>
<td></td>
<td>■ Cosmetics</td>
<td>■ Plastic</td>
</tr>
<tr>
<td></td>
<td>■ Pharmaceuticals</td>
<td>■ Paper</td>
</tr>
<tr>
<td></td>
<td>■ Bio-plastics</td>
<td>■ Metals</td>
</tr>
<tr>
<td></td>
<td>■ Lubricants</td>
<td>■ Wood</td>
</tr>
<tr>
<td></td>
<td>■ Bio-energy production</td>
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</tbody>
</table>

Food and drink manufacturers are increasingly acting as bio-refineries, in which agricultural crops are separated into different components, each of which finds useful applications including animal feed, fertilisers, cosmetics, pharmaceuticals, bio-plastics and bio-fuels.

What is a by-product? What is waste?

Directive 2006/12/EC defines waste as “any substance or object which the holder discards or intends or is required to discard”. While this definition serves its purpose in most cases, it evoked ambiguity with regard to the status of so-called co-products or by-products that are produced in a manufacturing process in addition to the primary product (e.g. whey, which is a valuable by-product from cheese production). For industry, it has always been evident that these products are not waste, but authorities have sometimes found it difficult to apply the definition accurately.

As a result, several cases referred to the ECJ have addressed the issue of non-waste by-products. The outcome is that many substances which may previously have been wrongly classified as waste are now rightly considered as non-waste by-products, because they are used in other sectors as useful economic input. In May 2007, the UK Defra, in its Food Industry Sustainability Strategy, states with regard to food industry by-products: “The change in interpretation is likely to have led to a substantial reduction in the overall food waste arising”.

In February 2007, the European Commission published guidance on the definition of waste and by-products based on this case law. It explicitly mentions “by-products from the food and drink industry used as animal feed” as an example for non-waste materials. This type of by-product alone amounts to 85 million tonnes annually in the EU, and does not include all the other useful applications of food manufacturing by-products (e.g. fertilisers, cosmetics, pharmaceuticals, bio-fuels).

These legal corrections are beginning to reflect the business reality where by-product use and waste prevention have been practiced in the food sector for many years.
II. Re-use, recycling and recovery

Minimising and making the most of waste

Waste prevention is the over-riding priority of the food and drink industry, and full by-product utilisation is an outstanding contributor to waste prevention. However, a minimum of waste is inevitable, and waste management along the lines of re-use, recycling and recovery of resources embedded in waste, is a prime focus for the sector. A particular priority is to minimise disposal and divert any remaining bio-degradable waste away from landfill into recovery and recycling. To cite just one example, the UK food and drink industry uses or recycles or recovers more than 70% of its production residues, which is above average compared with other sectors in the UK.

A. Solid waste

There is no precise data on the total amount of waste generated by the food industry in the EU-25. Existing figures from Member States are incomplete and waste categorisations at national level are often inconsistent, making it difficult to compare data. The European Environment Agency data base contains figures from 15 Member States concerning the amount of food processing waste in total national manufacturing waste (from different years). These national figures differ markedly, ranging from 1.2% in France to 52% in The Netherlands. According to this data, food and drink processing - on an aggregated level - would account for about 12.5% of manufacturing industry’s waste in these countries. In the EU as a whole, total manufacturing accounts for 26% of total waste generation. If the food industry’s share of 12.5% was applied to this total EU data, food industry waste would account for about 3.25% of overall waste generation in the EU.

However, these figures from 1999-2003 must be treated with a great deal of caution as since then the concept of waste has altered under EU case law. Several of the reported figures include by-products, which in today’s legal understanding are no longer considered as waste. Given the high utilisation of by-products from the food and drink industry, final waste arising...
Due to their renewable nature, by-products and waste from the food and drink industry can make a valuable contribution to the objective of reducing dependence on fossil fuels and achieving lower levels of greenhouse gas emissions.

Food and drink industry initiatives

1. Bio-degradable waste

It is a priority for food and drink companies to divert remaining bio-degradable waste away from landfill into sustainable recovery and recycling processes. Bio-degradable waste can be processed either in the presence of oxygen by composting, or in the absence of oxygen, by using anaerobic digestion. Both methods produce a soil conditioner, which when prepared correctly, can be used as a valuable source of nutrients in agriculture. Anaerobic digestion also produces methane gas, an important source of bio-energy. The energy embedded in bio-degradable residues can also be recovered in a combustion process. In all these cases, the material in question qualifies either as a by-product or as waste, depending on whether it meets all cumulative by-product criteria.

Examples

a) Composting

Compost plays an important role in top soil manufacture, land remediation and restoration, in horticulture, agriculture and landscaping, e.g. on sports grounds and golf courses. In the food and drink sector, composting is frequently applied as a pre-treatment method for bio-degradable residues that are then applied on land to improve soil quality. For this purpose, the bio-degradables are usually supplied to the composting industry. On-site composting by food and drink manufacturers is rare.

Example: Nestlé

Composting of spent coffee grounds

The production of soluble coffee generates a by-product, spent coffee grounds, which can be used - amongst others - as bio-based fertiliser and soil improver. To optimise the quality of this by-product prior to agricultural application, the spent coffee ground from the Nestlé factory in Girona is sent to an external, specialised composting plant, which uses this material like an ingredient to obtain high quality compost. This composting technique is recognised as good practice for valorising by-products.

b) Anaerobic digestion

Bio-energy from bio-mass contributes to reduced dependence on fossil fuels and lower levels of greenhouse gases. The EU has set a target of 20% for the share of renewable energies in total energy consumption by 2020. Due to their biological origin, by-products and waste from food and drink processing can make a valuable contribution to this objective. Their use also helps to reduce existing pressures on agricultural markets, stemming from an increasing diversion of arable land from food production towards the growing of first-generation bio-fuels.

Example: Remo-frit

Green electricity production from potato processing by-products

Remo-frit is a Belgian SME transforming potatoes into French fries and fresh peeled potatoes. During the production process, the residues of potatoes and their peelings are sent together with the used water, which is now enriched with starch, to an anaerobic reactor. In this reactor, the organic matter is transformed into bio-gas by natural degradation. The bio-gas is then used as fuel in a special engine with an electrical power of 630 kWh. Thus, Remo-frit is at the same time producer of potato products and of electricity.
c) Land application of organic residues
Loss of organic matter is one of the seven main threats to soil quality in the EU. Pre-treated food processing residues can be applied on land (landspread) under controlled conditions to improve soil quality and raise organic matter content. For instance, the land application of aerobic sludge from starch plants is practised under clear rules in several EU countries, e.g. France. Organic matter is degraded by soil bacteria and its nutrients are taken up by the crops or recycled into the soil. 

Food processing residues are often a good source of nitrogen (N), phosphorous (P) and potassium (K). To determine precisely how much N, P or K will be available to crops, the residues need to be analysed. Also the soil receiving these materials has to be tested regularly in order to determine its nutritional interest.

d) Energy recovery
Finally, the energy embedded in biodegradable residues can be recovered in a combustion process. For instance, the combustion of brewers' grain holds a big potential for energy and cost savings in breweries. This technology strengthens the independence of breweries from external energy sources and leads to a substantial competitive advantage. Rising energy prices will affect the overall production costs less severely due to an almost autonomous energy source.

Example: Energy recovery from brewers' grain at Brewery Göss, Austria
In 2002, the world’s first plant for energy recovery from brewers’ grain was put into operation by Brewery Göss in Austria. The plant is designed for a capacity of 2 to 3 t/h of wet brewer’s grain, which corresponds to a full steam capacity of 2 to 3 MW and an operating pressure of 8 bar. The experience gained through this pilot plant serves as a valuable basis for further projects. Patents for this method are pending in 28 countries.

2. Non-biodegradable waste
Non-organic waste in the food sector includes used products such as pallets, crates, plastic, paper and metals. These are typically collected separately on site for recycling or energy recovery. Today hardly anything is disposed of.

Example: FDF - Research on waste sources and treatment options in the UK
The UK Food and Drink Federation (FDF) has worked with Envirowise on a number of occasions in the past on waste and other environmental issues. Specifically the Scottish FDF, a devolved Division of FDF, has formed a Scottish Food Chain Group (comprising the National Farmers Union of Scotland, Sea Fish Industry Authority, Scottish Retail Consortium, Scottish Grocers Federation, British Hospitality Association as well as the SFDF), which is developing, in conjunction with Envirowise, a framework for action on waste and resource efficiency. This includes working on the development of a programme of workshops and an outline specification for research into waste streams that are generated by the food chain, and the options for handling or disposing of such waste. FDF is also a member of the Champions’ Group on Waste under the UK Defra’s Food Industry Sustainability Strategy.

B. Industrial waste water
Waste water is the most common waste in the food and drink industry. This is because food processing involves a number of unit operations in which water is an essential requirement, such as washing, boiling, evaporation, extraction, filtration and cleaning. European food and drink manufacturers undertake significant efforts and continuous investment to ensure sound waste water treatment, which consists of three main elements: First, to reduce the amount of waste water through efficient processing methods. Second, to improve the quality of waste water through state-of-the-art water treatment. Third, to optimise the re-use, recycling and recovery of waste water whenever this is possible without compromising stringent EU hygiene requirements.

Waste water reduction
In member states, for which reliable data is available, water discharge from food processing fell notably over the last decade, e.g. by 30% from 1994 to 2001 in the Belgian region of Wallonia while production output increased by 28% over the same period. Process water is generally micro-biologically purified in private and/or public treatment installations before being discharged into the environment.

Evolution of the total water discharge from the food and drink industries in the Belgian Region of Wallonia

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<tr>
<td>2001</td>
<td>350</td>
<td>0</td>
</tr>
</tbody>
</table>

Water quality improvement and recovery
Quality control of discharged water is a second key element in waste water management in the food and drink industry. In several cases, a “win-win” solution is feasible: The organic components contained in the process water can be valorised to produce energy (anaerobic digestion),...
Food and drink manufacturers undertake significant investment in state-of-the-art waste water treatment to further improve the quality of discharged water and to optimise energy and resource efficiency.

Building on achievements

- Waste prevention remains industry’s priority in the field of resource management. The utilisation of all components contained in agricultural raw materials still offers a huge potential for further resource-efficiency gains.
- Food and drink companies continuously invest in new technologies to adapt their by-products to emerging new markets. Further environmental and economic gains can be realised through intensified cooperation between business partners and the research community with a view to exploring new technologies. Current R&D covers areas such as the utilisation of proteins, oils, sugars, vitamins, colourants or antioxidants contained in the crop.

Actions required from other stakeholders

- To allow the full environmental and economic benefits of complete raw material utilisation to be realised, long-term legal certainty is required regarding the important distinction between non-waste, including by-products, and waste under EU waste law. This legal certainty is essential in order to justify the significant investment needed for adjusting by-products to the needs of existing and emerging new markets. EU legislation must facilitate, not hinder, resource-efficiency in this field and must provide the industry with a clear legal basis for its ongoing efforts to optimise raw material use.
- Flexibility of waste management options is required under EU legislation. The waste hierarchy has to be seen as a guiding principle, which does not provide a “one-size-fits-all” solution. In waste management reality, no product or waste stream is identical, and flexibility between re-use, recycling and recovery is required to identify the option that offers the best overall environmental, economic and social results.
3 Energy & climate change

Improving energy efficiency - cutting emissions

THE ISSUE

- The food and drink industry fully supports the promotion of energy efficiency as an important driver for industrial competitiveness and to reduce emissions of greenhouse gases (GHG).

- While the food and drink sector is characterised by relatively low energy intensity compared with many other industrial sectors, sharply rising energy prices have become a notable cost factor in several sub-sectors.

- The food and drink manufacturing industry accounts for about 1.5% of total GHG emissions in the EU-15. GHG emissions fell by 3% from 2004 to 2005 and CO2-intensity has fallen by 25% since 1990 compared with economic growth.

- Within the food chain, agriculture accounts for 49% of GHG emissions, followed by consumers with 18% and manufacturing with 11%.

- Food and drink manufacturers are demonstrating genuine leadership in energy and carbon management. This includes voluntarily cutting energy use, fuel switching, investing in energy efficient and low carbon technologies, participating in national or sector energy efficiency schemes, and carrying out detailed energy audits and feasibility studies.
The challenge

There is mounting evidence that the world’s climate is changing, and that the burning of fossil fuels, along with land use changes and agriculture, are among the principle causes.

The EU is determined to tackle global warming and in 2007 adopted ambitious targets in its new energy and climate change policy. These include reducing greenhouse gas (GHG) emissions by 20%, improving energy efficiency by 20%, raising the share of renewable energy sources by 20% and the share of bio-fuels in road transport by 10%. All targets apply to the year 2020.

There is increasing pressure on energy users to improve their energy efficiency. This is not only a result of regulatory drivers. It is also caused by rising and highly volatile energy prices, and concerns over supply security.

The envisaged transition towards a low carbon economy will have far-reaching impacts on all economic sectors, including the food and drink industry. Impacts on the food sector may also stem from global warming itself. Climate change may affect agriculture, availability of clean water and sea temperatures, and this in turn could have direct effects on the sustainability of the food and drink business.

The industry’s manufacturers are therefore committed to contributing fully to the EU’s policy objectives in the field of energy and climate change and are undertaking a wide range of activities and investments to cut energy use and GHG emissions.

1. Energy use in the food and drink industry

Food and drink manufacturing is characterised by relatively low energy intensity, although there are major differences in energy intensities between the various sub-sectors. In the OECD area, food and drink manufacturing accounts for about 8% of industrial energy use, ranking 5th behind primary metals, chemicals, paper and pulp and non-metallic minerals (see graphs below).

Food and drink manufacturing requires process heating and cooling, as well as electric power. Heating processes account for the dominant part of the sector’s overall energy requirements, comprising high temperature processing such as boiling, drying, pasteurisation and evaporation.

Low temperature processes such as freezing and cooling are also important in many sectors. Electricity is required for the operation of processing machinery, such as fans, pumps, ventilation, mixing, compressed air, refrigeration and cooling.

Energy efficiency is more than an environmental issue today - it is about saving money in order to remain competitive.

Energy use and energy intensities by manufacturing sub-sector
(source: International Energy Agency, IEA-11)

Total final energy use (exajoules) 1998 Energy intensity (megajoules/USS)

- Primary Metals
- Non-metallic Minerals
- Other Manufacturing
- Food, Beverages & Tobacco
- Chemicals
- Paper & Pulp

Energy efficiency is more than an environmental issue today - it is about saving money in order to remain competitive.
Food manufacturing > Energy and Climate Change

2. GHG emissions in the food and drink manufacturing sector

GHG emissions from food and drink manufacturing are almost exclusively energy-use related (> 99%). Process emissions in the industry are very low and predominantly CO2-neutral from processes such as fermentation.

Energy-use related emissions in the food industry can be divided into:
1. direct (on site) emissions (burning of liquid, gaseous and solid fuels on site)
2. indirect (off-site) emissions from electricity purchased from power plants

The food and drink manufacturing industry’s direct emissions accounted for 0.9% of overall GHG emissions in the EU-15 in 2005 (source: EEA).2

The food and drink manufacturing industry’s indirect emissions typically represent about 35-40% of the sector’s total CO2 emissions. Therefore total CO2 emissions from the sector can be reasonably estimated to represent a share of 1.5% in overall EU-15 GHG emissions.3

3. Emissions trends in the food and drink industry

Between 1990 and 2005, the economic value of the food and drink industry’s production output has grown by more than 51% in the EU-15 and today amounts to more than €730 billion per year. Despite this notable economic expansion, growth in CO2 emissions in the sector has been limited to 13% over the same period, reflecting a relative decoupling of economic growth from CO2 emissions. This has been achieved despite significant life-style changes that increasingly shift consumer demand towards food and drink products that often require additional processing by manufacturers, e.g. chilled foods, ready meals, ‘life-style’ foods, and smaller and more convenient package sizes. It is particularly encouraging that since 2002 absolute CO2 emissions in the sector have stagnated despite continued economic growth, and that in 2005 emissions fell by 3%. For the EU food and drink industry, which today comprises 27 national economies, this is a very positive and reassuring signal, which reflects the increasing commitment of food and drink companies continuously to improve their energy and carbon management.

EU-15 food and drink manufacturing industries

| Source: EEA |

- Economic growth: +51% since 1990
- Direct CO2 emissions: +13% since 1990

EU-15 GHG emissions by sectors - 2005 (Source: EEA)
Food and drink industry initiatives

The food and drink industry considers energy efficiency and carbon management important drivers for increased industrial competitiveness and improved environmental sustainability. Food and drink companies are making significant efforts and investments to improve their energy performance and to reduce GHG emissions, e.g. via the adoption of best practices, investing in energy efficient and low carbon technologies, fuel switching, participating in national or sector energy efficiency schemes, detailed energy audits and feasibility studies.

Within the food chain, agriculture accounts for about half of the greenhouse gas emissions, followed by consumers with 18% and manufacturing with 11%.

GHG emissions across the food chain have been investigated as part of the UK Government’s Food Industry Sustainability Strategy (FISS). Whereas variations exist in the GHG composition in different EU Member States (size of the sector, national energy mix, supply chain structure, trade), this data provides a representative and realistic overview of GHG emissions of the food chain’s players.

GHG shares of the food chain players

The entire food chain accounts for 17% of total UK GHGs. The largest source of GHGs is agriculture with 49% of food chain emissions, which is due to the importance of non-CO2 GHGs methane and N2O. This is followed by consumers with 18% of emissions, including food shopping by car, home cooking, cooling and freezing and dishwashing. Food manufacturing ranks third, accounting for 11% of the food chain’s GHG emissions.
The food and drink industry’s sustainable energy roadmap

1. Demand side (energy end-use)
   a) Implementation of energy efficiency measures
      - Define and apply sector best practice on energy management
      - Identify major energy saving opportunities within the plant, e.g. via an energy audit
      - Develop an energy action plan and integrate it into daily business practice
      - Monitor energy efficiency savings over time, use benchmarking where sensible
      - Participate in national and sector energy efficiency schemes

   b) Investment in low carbon technology
      - Consider energy efficiency in long-term investment decisions
      - Explore potential for co-generation (CHP), tri- and poly-generation, and other technologies
      - Gradual move towards HCFC and HFC-free refrigeration technology

2. Supply side (heat and power generation)

   Move towards renewable and low-carbon energy sources (internal and external)

   a) External sources
      - Electricity is mainly sourced from the grid. Its CO2-intensity depends on the national energy mix
      - Purchasing of low carbon power from certified suppliers may become an option

   b) Internal sources
      - For heat generation, switch from oil and solid fuels to natural gas, renewables and biomass
      - Explore the potential for increased on-site generation of low carbon energy, e.g.:
        - Bio-gas production from by-products, waste, process water, etc.
        - Use of by-products as renewable, CO2-neutral fuels in combustion plant
        - Explore potential for other renewable energy sources, e.g. solar heat, wind

EU Emissions Trading Scheme (ETS)

The EU ETS aims to ensure that GHG emissions are cut at lowest possible costs to industry. The scheme is mandatory for food and drink companies operating combustion installations above 20 Mega Watt. In France, for instance, 13.6% of all ETS installations are at food and drink sites. Under the EU ETS, food and drink companies are making continuous progress towards reduced CO2 emissions. In 2005, the first year of the EU ETS implementation, CO2 emissions from combustion installations in the food and drink sector (inside and outside the ETS) fell by 3%.

Long-term energy efficiency agreements

In several EU Member States, the food and drink sector is participating in Long Term Agreements (LTAs) on energy efficiency between government and industry.

Here are some examples:

**LTAs in The Netherlands**

The first LTA was signed in 1992. The agreements involved detailed energy audits of industrial facilities. Over 29 sectors participated in LTA covenants up to the year 2000 representing > 90% of total industrial energy consumption of The Netherlands. From 1992 to 2000 cumulative energy efficiency improvement was equal to 22%. Under LTA 2, companies must introduce all suitable process efficiency measures with a pay-back time of five years or less and introduce an energy management system in line with ISO 14001 within two years.

**LTAs in The UK**

To qualify for an 80% reduction in the UK climate change levy, 10,800 facilities from 44 sectors signed 10 year CO2 reduction targets. In 2005/06, Carbon Trust completed 5,400 energy audits. Between 1.1 and 1.6 Mt CO2 savings were realised through
the measures implemented. In 2006, the eight agreements covering food and drink manufacturers reported savings in absolute CO2 emissions of 300,000 Te compared with a 1999 baseline.

**LTAs in Belgium**

In 2004, 132 Belgian food and drink companies, representing more than 80% of energy use in the sector, signed an Energy Efficiency Agreement with the authorities. Based on a detailed energy audit or a benchmark, each company signed a formal commitment to achieve clearly defined energy use reduction targets by 2012. Three kinds of LTA exist in Belgium:

- For the Walloon Region, the improvement target is 10.9%.
- In the Flemish Region, the biggest food and drink companies will reduce their energy consumption by 3.3 PJ.
- For another group of smaller food and drink companies in the Flemish Region, the target is not yet adopted but is expected to be higher than 5%.

**Industrial audits in France**

Decision making processes for companies are assisted through national financial support schemes for pre-diagnostic audits, as well as other detailed audits and feasibility studies.

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Switching from oil to natural gas and renewable energy sources, the adoption of best management practices and continuous investment in energy efficient processing technologies, are cornerstones of the industry’s sustainable energy strategy.

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**Case studies and examples from companies and federations**

Many food and drink companies are demonstrating genuine leadership in energy efficiency and carbon management. There are innumerable examples of corporate and sector strategies and initiatives to cut both energy consumption and CO2 emissions. Some of these actions and achievements are outlined below.

**UK food and drink manufacturing sector**

CO2 emissions from the UK food and drink manufacturing industry fell by 15.2% from 1990 to 2004. This was a result of fuel switching from coal and oil to gas in the 1990’s, as well as ongoing industry actions to improve energy efficiency and the impact of the UK’s climate change agreements. The UK food and drink industry represented 13% of the European food and drink sector’s total production value in the EU-15 in 2005.

**British brewing sector**

Energy consumption in the UK brewing industry as represented by BBPA, accounting for 98% of UK beer production, fell by 54% in the years between 1976 and 2006 (by 30% since 1990).
Friesland Foods: Reducing fuel consumption and CO2 emissions

The company monitors energy-related CO2 emissions on the basis of natural gas and oil consumption. The continuous reduction in emissions (-35% CO2/tonne of product between 2000 and 2004) is a direct result of the reduced use of fuels.

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Kraft Foods: Focused energy reduction measures in manufacturing

Improved usage reduction programmes and processes, together with the application of technological innovations that promote energy efficiency, resulted in a 14% decrease in energy use and a 21% decrease in CO2 emissions in 2006 compared with 2001. CO2 emissions in 2006 were 9% less versus 2005, due primarily to energy reduction in manufacturing involving natural gas and electricity use. Total energy usage in 2006 was reduced by 11% versus 2005.

INBEV: Bio-gas production from waste water

InBev has been working hard to explore alternative waste water treatment methods, including anaerobic treatment, which uses less energy, produces less process water sludge and also generates bio-gas as a by-product, which is used as fuel. In 2004, 10 InBev breweries produced sufficient biogas to generate over 102,637 GJ of energy, which otherwise would have been sourced externally (equalling the annual energy consumption of 9,500 households).

Danone: Internal target setting and key performance indicators

Group Danone set itself the goal of reducing its energy consumption by 20% between 2000 and 2010. Mid-term results in 2005 confirm that the group’s target will be achieved earlier, since in 2004 the energy savings already amounted to 17.8%, reflecting an annual decrease of 4%.

The group’s approach comprises, inter alia, precise organisation of the work place, the definition of key performance indicators and the integration of energy management into daily business practice. This is accompanied by energy audits and investment in energy efficient equipment.

Unilever: Continuous reductions in CO2 emissions

From 1995 to 2006, Unilever reduced CO2 emissions per tonne of production by 33.5%. In the next five years the company’s target is to reduce CO2 emissions by another 12.5% compared with 2006 levels. Of the total energy used by Unilever sites, 14.8% comes from renewable sources.

Kg/tonne of production
Nestlé: Using spent coffee grounds as CO2-neutral fuel:

Nestlé’s worldwide operations include more than 20 soluble coffee factories, in which spent coffee grounds are used as a renewable, CO2-neutral fuel. This integrated approach to managing by-products and energy requirements has produced a series of positive environmental results: decreased reliance on fossil fuels, saving more than 45,000 TOE/year, reduced SOx emissions and prevention of about 800,000 tonnes of organic material from going to landfill, where it would produce methane gas.

Greenhouse gases per tonne of production have been reduced by 56% in 500 Nestlé factories worldwide (1997-2006).

BESS project on energy efficiency in SMEs in the food sector

In April 2007, the EU co-funded project BESS (Benchmarking and Energy Management Schemes in SMEs) finalised an innovative e-learning scheme to implement energy efficiency measures in small and medium sized enterprises (SMEs) in the food and drink sector. The BESS tools were developed by a consortium of national energy agencies and consultancies and tested in over 50 food and drink companies in 11 EU member states. CIAA actively supported the project through its continued participation in the BESS Project Advisory Group, which consists of members of the project consortium, the European Commission, the International Energy Agency and CIAA. The tools consist of an energy management specification, an implementation model, a handbook, a web based e-learning system, a bench-marking scheme and templates for energy audits, measure lists and checklists. www.bess-project.info

Heineken: Bench-marking in the brewing sector

In 2003, Heineken, together with other Dutch breweries, developed a bench-marking scheme to determine the energy efficiency of breweries in The Netherlands and internationally. Heineken’s electricity consumption decreased from 9.91 kWh per hectolitre in 2004 to 9.59 kWh per hectolitre in 2005 (minus 3%). This total is just above Heineken’s 2005 target within its overall goal to reduce electricity consumption by 15% within 5 years.

Specific thermal energy consumption
breweries and soft-drink plants

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Specific electricity consumption
breweries and soft-drink plants

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Green energy from dairy production:
How the Austrian dairy company Landfrisch powers 1,250 households by innovating its use of whey

In times of rising climate awareness and soaring energy prices, food and drink manufacturers increasingly are becoming suppliers of green energy. In July 2006, the Austrian dairy company “Landfrisch” launched Europe’s first bio-reactor for the production of bio-gas from sour whey. The production of cheese generates two products: cheese as the main product and whey as a by-product. In the past, Landfrisch Wels sold the whey fractions to neighbouring pig farmers as valuable animal feed. With increasing volumes of cheese production, the company started investigating alternative options to valorise their whey.

The plant management opted for the construction of an on-site bio-gas plant and achieved impressive results: The bio-reactor has a performance of 500 kW in electrical output and 580 kW in thermal output. This corresponds to 33% of the total energy needs of the plant. Landfrisch feeds the produced electricity (12,000 kWh/day) directly into the Austrian power grid, thereby supplying 1,250 households with energy, while 100% of the reactor’s heat output is re-used internally. The remaining fermentation sludge is composted and used as bio-fertiliser on surrounding farms. The company anticipates pay-back within four years. In recognition of the excellent results, in 2006 Landfrisch was named the overall winner of the Austrian Energy Globe award.

The UK Food and Drink Industry Refrigeration Efficiency Initiative
To help food companies cut energy costs, the UK Food and Drink Federation (FDF) launched the Food and Drink Industry Refrigeration Efficiency Initiative, a project sponsored by the Carbon Trust and supported by other food chain players and the Institute of Refrigeration. The project developed an energy efficiency guide for industrial refrigeration systems used in the food and drink industry. It is based on investigations carried out at 30 sites and covers four specific topics: Reducing heat loads; improving the condenser system; optimising the part load performance; and reducing power used by auxiliary pumps and fans. The project has identified energy efficiency opportunities leading to CO2 reductions of over 25,000 Te CO2.

Refrigeration
Reducing GHG emissions in refrigeration

Hydro Fluoro Carbons (HFCs) are used as refrigerants in some types of refrigeration systems, for which currently no viable alternatives exist. If accidentally released into the atmosphere, HFCs contribute to global warming. Although HFCs are a very small source of GHG emissions in the food industry (accounting for around 0.2% of the sector’s emissions), the food industry is gradually moving towards alternative refrigerants as they become technically and economically viable, safe and energy efficient. Where viable alternatives are not yet available, the food industry fully supports the objective of the new EU F-gas Regulation to prevent HFC emissions through an advanced containment regime. This new regulation entered into force in 2007 and is expected to realise significant reductions of HFC releases.

Shifting to HFC-free solutions in point-of-sale refrigeration

Refrigerants, Naturally! is a multi-stakeholder initiative launched by The Coca-Cola Company, Unilever and McDonald’s. Today it also includes Carlsberg, PepsiCo and IKEA. Its goal is to promote a shift in point-of-sale cooling technology to alternative HFC-free solutions that protect both the climate and the ozone layer. For this purpose, all members develop time-lines and share information among themselves, as well as with stakeholders. The initiative is supported by Greenpeace and UNEP and officially recognised by the UN as a Partnership for Sustainable Development.
Long-term carbon reduction targets require intensified efforts among business, authorities and the research community to align R&D with industry’s needs and to foster the economic competitiveness of emerging technologies.

Building on achievements

Countless food and drink companies have integrated energy and carbon management into their daily business practices and are achieving impressive results. The challenge lies in helping under-performing companies to catch up, while encouraging front-runners to further improve their achievements. In moving towards sustainable energy and carbon management, manufacturers often face a number of barriers which can be summarised as follows:

**Investment barriers**
- Long pay-back periods in a sector used to short investment cycles
- Availability of investment funds
- Lack of commercial competitiveness of emerging technologies
- Investment uncertainty
- Gas and electricity price volatility (e.g. CHP)

**Management barriers**
- Integration of energy and carbon issues at top level. In many sub-sectors, energy accounts for a low share of overall costs
- Lack of skilled and informed staff, especially in SMEs, intension/ability gap

**Barriers to sharing best practices**
- Best practice sometimes seen as a competitive advantage

**Technological barriers**
- Remaining technical insufficiencies of emerging technologies

Depending on the type and size of a company, its financial and human resources, and its experience with energy and carbon management, different instruments and support schemes are required.

**Appropriate measures divide into short- and long-term strategies:**

### Short and mid-term strategies for managing a carbon restrained future

**Spreading existing best practice across industry**

Short and mid-term energy use and carbon reductions will be achievable if existing best practice on energy management is spread still more widely within the sector. Associations are playing an active role in supporting, sharing and encouraging the spread of best practice, though it is often more difficult for them to reach small and medium enterprises (SMEs) in the industry.

### Long-term strategies for managing a carbon restrained future

Long-term targets require additional focus, R&D, investment and increased cooperation among all stakeholders, including businesses and public authorities.

**R&D and Innovation**

Technological developments are expected to deliver significant GHG savings. Industry will work closely with authorities to align research and development (R&D) with industry’s needs and to implement the results of beneficial R&D. Particular attention must be paid to improving the commercial competitiveness of emerging technologies.

**Transformation of energy supply**

Long-term GHG reductions in the food and drink sector may require a major transformation in energy supply, e.g. through the development of renewable and low-carbon energy sources.

**a) Self-generation**

An important option to consider is increased self-generation of low carbon energy on-site. Due to the agricultural nature of raw materials used in the food sector, there is technical potential in several sub-sectors to generate bio-based, carbon-neutral energy from by-products and waste (e.g. anaerobic digestion). At the same time, these by-products serve important alternative purposes along the food chain, e.g. animal feed. Renewable energies also include, amongst others, wind turbines and solar heat.

**b) Purchasing low carbon energy**

The second option is to purchase low carbon electricity from licensed suppliers.

### What we do as an industry

- Awareness raising for energy and carbon management, in particular in SMEs
- Definition and dissemination of best practices in energy efficiency
- Facilitate investment in low carbon technology by providing information on existing technologies, investment parameters and saving potentials
- Constructive cooperation with all relevant EU and national stakeholders, including participation in R&D projects, funding schemes and private-public partnerships

### What support is required from external players?

- Public authorities and energy agencies to help promote energy efficiency at the level of SMEs (e.g. provision of free energy audits and other relevant expertise)
- Financial support schemes to overcome existing investment barriers (e.g. CHP)
- Continued R&D to push innovation
- Improve the competitiveness (commercial viability) of low-carbon technologies
- Member states to align national energy mix with GHG reduction targets
Water
Conserving the source of life

THE ISSUE
Access to water is critical for the food and drink industry, both in terms of quantity and quality. Clean water is not only a prerequisite for agricultural sustainability; it is also an important product in its own right, a main ingredient and key processing element. The challenge for the food and drink industry in terms of water use is twofold:

- Continuously reduce levels of water consumption in its processes by improving water efficiency without compromising strict food hygiene requirements.
- Promote the responsible use of water and maintain sustainable water supplies throughout the food chain, including agriculture.
The challenge

In the food and drink sector, water serves three key functions:

1. The highest volume of water in the food chain is used in agriculture, representing around 70% of global fresh water consumption and around 37% of water use in Europe (EU-27).
2. In food and drink manufacturing, water is both a product and a main ingredient (for bottled water, non-alcoholic and alcoholic drinks, etc.).
3. Water is also an indispensable element in many food-processing steps, such as washing, boiling, steaming, cooling and cleaning. In all food sub-sectors, water plays a crucial role in guaranteeing strictest hygiene standards.

Available data on the food and drink industry’s water use is incomplete and not always consistent. The breakdown of water consumption between the various sub-sectors varies considerably from one region to another, depending on natural conditions and economic and demographic structures. Data from the EEA (European Environment Agency) shows that in 2001, industry as a whole accounted for slightly less than 12% of overall water use in Europe. Estimates from various national food and drink industry federations suggest that, at present, the food and drink manufacturing industry is responsible for a share of between 8% and 15% of total industrial water use. If this share was applied uniformly to the EU level, total water use in the food manufacturing sector would represent between 1% to 1.8% of overall water use in Europe.

Food and drink industry initiatives

Reducing water consumption in our own operations

Concrete action to improve water efficiency at factory level falls into two categories: behavioural changes (best management practice) and investment in water-efficient technology.

a) Behavioural changes - best practice

Behavioural change is “the low hanging fruit” for water-efficiency. It incurs limited costs yet can save substantial amounts of water. Behavioural improvements cover a variety of initiatives, which require specific staff training and communication tools. They include: developing water consumption monitoring tools, modifying cleaning and housekeeping routines; increasing staff awareness; identifying and repairing leaks promptly; using sensor-controlled taps and auto-flush toilets or using hand-controlled triggers on hoses.

To give one example, FEVIA, the Belgian food and drink industry federation, developed a “Vademecum for use of water in the food and drink sector” to broaden and encourage good water management practices, in particular in small and medium enterprises (SMEs).
FEVIA: Water use efficiency in the cleaning process

Improving water efficiency in cleaning is one of the management practices included in the FEVIA handbook. Cleaning processes allow frequent eco-efficiency improvements with only limited costs. Notable examples are prior dry cleaning and the adjustment of water hoses.

■ Prior dry cleaning is a measure that has an impact both on discharge and on water consumption. The elimination of dirt particles improves the efficiency of subsequent cleaning, for example with foam. In fact, foam does not work efficiently when, for example, fat particles remain on the floor surface.

■ The adjustment of water hoses is a measure that yields significant water savings. Cleaning is sometimes carried out using strengthened fire hoses that can easily consume 40 litres of water per minute whereas a rate of around 10 litres per minute is sufficient in many cases.

Water efficiency in small and medium enterprises (SMEs)

Continuous technological improvements are also made in SMEs, as is the case in the brewing sector:

■ Brewery Liefmans: In the past, water used for cooling flasks (after pasteurisation) was drained to the purification installation. Now, a cooling tower has been installed, which cools the water and allows recuperation. Water usage in the pasteurisation unit has decreased from 5.5 m³/hour to 3.5 m³/hour, corresponding to a water saving of 20% of total usage.

■ Brewery Timmermans: By closing the water tap on the bottle washer a little more, the water usage of this device was reduced from 44 m³/day to 35 m³/day, without loss of efficiency. Water savings of 5% of total usage were achieved.

Protecting water supplies outside food and drink factories

In addition to water eco-efficiency within their own operations, many food and drink companies are engaged in initiatives to protect water source areas. This helps to maintain sustainable water supplies, both in terms of quality and quantity.

Sugar industry: Re-using the water content of sugar beet

One of the objectives of the European sugar industry is to keep fresh water consumption at an absolute minimum. To achieve this goal, a number of different measures are applied. The most important source of water in the factories is the sugar beet itself. It contains about 75% water, most of which is turned into steam during the production process, and then condensed. This condensate is used for beet transport and washing water, as well as for extraction and crystallisation. Water from pressing the exhausted pulp is also recycled. This means that sugar factories not only keep fresh water consumption to a minimum but also avoid producing wastewater from the pulp pressing.
While food and drink manufacturers are realising continuous water savings, there are technical limits, and a certain level of fresh water will always remain necessary to ensure compliance with strict EU food hygiene standards.

Danone’s water source area protection

As the operator of 72 natural springs around the world, Danone applies rigorous standards that are set down in its charter for the protection of underground water resources. The charter’s first principle states that Danone must never use more water than each spring naturally produces. The second principle requires Danone to cooperate with farmers, communities and other local stakeholders to draw up guidelines for sustainable management. A local manager is appointed to oversee operations at each spring in partnership with local communities and participants in the local economy. In 2005, Danone contributed to the renovation of the entire waste water system for the communities around Evian and helped hire forest rangers to prevent fires in catchment areas in Spain. Internationally, Danone is an active partner in the Ramsar Convention for the protection of wetlands, which play a key role in the eco-system by filtering rainwater and replenishing water tables.

Overall achievements

Official data show that total water consumption in Europe by industry in general has decreased consistently since 1990. Although the extreme diversity of the food and drink sector makes it difficult to gather complete data on its EU-wide cross-sector water consumption, reliable data from individual food and drink companies, national federations and sub-sector federations indicate a comparable trend in water use reduction over the past decade.

Example 1: Belgian food and drink industry

Between 1999-2001, the Belgian food and drink industry reduced its specific water consumption (per tonne of products) by 14% and its absolute water consumption by 12%.

Specific water consumption in Belgian food and drink industry (per tonne of production)

<table>
<thead>
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<th>Year</th>
<th>m³/t</th>
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<tbody>
<tr>
<td>1999</td>
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<td>2001</td>
<td>6.48</td>
</tr>
</tbody>
</table>

Example 2: UK brewing sector

Between 1976 and 2004, members of the British Beer and Pub Association, representing more than 98% of beer brewed in the UK, reduced their specific water consumption (per hectolitre brewed) by 43%.

Specific water consumption (hectolitre per hectolitre brewed)

<table>
<thead>
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<th>Year</th>
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</tr>
<tr>
<td>2004</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: EEA
Example 3: Nestlé

Nestlé, since 1997, has almost doubled its food production. Over the same period, its absolute water consumption decreased by 29%, representing a reduction of its specific water consumption by almost two thirds.

Example 4: Sugar company Nordzucker

This example from a German sugar company shows that fresh water consumption has been reduced by 240,000 m³ since 1995. This corresponds to a reduction of 60% for an unchanged volume of sugar production. Water reduction has been achieved through improved re-use of water contained in sugar beet (75% of beet is water) for beet transport, washing and evaporation purposes.

Hygiene constraints

While water savings are continuously achieved by food and drink manufacturers, there are technical limits, and a certain level of fresh, clean water use will always remain necessary to ensure compliance with strict EU hygiene standards. For example, the re-use of water from on-site cleaning stations is regulated by Regulation (EC) No 852/2004 on the hygiene of foodstuffs, stipulating that recycled water used in processing or as an ingredient has to be of the same standard as clean drinking water. Authorities tend to interpret quality requirements in the strictest terms in order to prevent any risk of contamination. The food and drink industry supports the highest hygiene standards to guarantee food safety.

Building on achievements

Based on its achievements in water use reduction, the food and drink industry is committed to improving water management practices even further, and to exploring new saving opportunities:

Behavioural changes

Several national, sector and company initiatives have developed best practice on water management, with potential for low-cost replication throughout the food sector.

Continued investment

Capital-intensive investment depends on a number of parameters, including water prices, investment cycles, pay-back periods, available funding in SMEs, etc. Public policy can play a positive role in creating a favourable climate for continued investment in water efficiency.
Working with the food chain

In particular, large food and drink companies have proved their ability to reach out to other partners in the food chain in order to reduce water consumption throughout the food production system.

Unilever’s work with farmers

Water is one of 11 sustainable agriculture indicators at Unilever. The company is working with growers to reduce their water impacts through methods such as drip-irrigation. For example, in 2006, the company ran training programmes for farmers in Italy on best practice in spinach irrigation. Initial results are promising on both water use and the energy required to pump the water. In Greece, almost all Unilever’s tomato growers now use drip-irrigation.

Working internationally

Large multi-national companies are increasingly playing a positive role in promoting sustainable water use and water governance worldwide.

Unilever’s engagement with external stakeholders

Unilever continues its involvement in Water and Sanitation for the Urban Poor (WSUP), a partnership between the private, public and civil society sectors. WSUP seeks to demonstrate new approaches to meeting the water, sanitation and hygiene needs of low-income consumers in urban areas, particularly in developing and emerging markets.

The “CEO Water Mandate”: A business leader initiative in partnership with the global community

This initiative grew out of a partnership between the United Nations Global Compact, the Government of Sweden and a group of committed companies, including The Coca Cola Company and Nestlé, and specialist organisations dealing with problems of water scarcity. The CEO Water Mandate seeks to engage a critical mass of companies from around the world, willing to undertake serious efforts, in partnership with other stakeholders, to address the emerging global water crisis. Whenever possible, this initiative coordinates efforts and works with existing water programmes - both global and local - in order to maximise impact.

www.regeringen.se/content/1/c6/08/54/73/1d280de2.pdf

The World Business Council for Sustainable Development (WBSCD) water scenarios project

The World Business Council for Sustainable Development brings together companies from a wide range of industry and service sectors, including food and drink companies like PepsiCo, Procter & Gamble and Unilever. It has developed the “Water Scenarios to 2025” project to identify strategies for businesses to contribute to sustainable water management. In August 2007, the Water Working Group launched its “Global Water Tool”, a free and easy-to-use tool for organisations to map their water use and assess risks relative to their global operations and supply chain.

Water education for future generations

The food and drink industry believes that education is an essential element in changing habits and increasing water consciousness. Food and drink companies are involved in many education programmes.

Nestlé project “WET”

Water Education for Teachers (WET) is a non-profit organisation, providing education resources which facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources. Launched in the United States in 1984 and continuously sponsored by Nestlé Waters since 1992, Project WET workshops and programs have trained over 400,000 teachers, reaching several million children in over 20 countries (including France, Hungary, Italy and Ukraine).

Action from other stakeholders

■ Sustainable water management along the food chain requires shared responsibility from agriculture, industry, consumers and public authorities.

■ Specifically, to encourage water savings in all economic sectors, water prices should reflect real costs in line with the EU Water Framework Directive.

■ At the national level, attention should be paid to the proper implementation of water legislation in all sectors in order to ensure high water quality and quantity.

■ Best agricultural practices need to integrate water preservation as a key component.

■ EU and national policies should support efficient water management and technology in all economic sectors.
Packaging

Protecting what’s inside

THE ISSUE

- As major user of packaging, the food and drink industry recognises its responsibility to reduce the environmental impacts of packaging along the life-cycle.

- At the same time, packaging is essential to ensure product quality and food safety. By avoiding food waste, packaging also protects the environment (e.g. transport, extended shelf life).

- Sociological trends (e.g. more single households) are driving significant changes in the demand for packaging, which often counter-balance technological improvements in packaging waste prevention.

- The main challenge lies in the reduction of packaging materials without compromising food quality, safety and consumer needs, while ensuring sound recovery and recycling of packaging waste.

- Despite growing packaging consumption, packaging waste sent for final disposal fell by more than 20% between 1997 and 2004.
The challenge

As a major user of packaging, the food and drink industry fully recognises its responsibility to reduce the environmental impact of packaging across the life-cycle. The main challenge lies in reducing packaging material without compromising food quality, safety, product integrity and consumers’ needs; and also in ensuring sound recycling and energy recovery of packaging waste.

Packaging ensures product quality and food safety

Packaging plays a key role in sustainability across the supply chain. Its main functions are:

- Protecting, containing and preserving the product during transport and storage
- Enabling efficient manufacturing, handling and distribution
- Providing commercial and consumer information
- Presenting and marketing the product
- Ensuring tamper evidence and facilitating product use
- Ensuring safe use and handling by consumers

Above all, in the food and drink sector, packaging is essential for preserving food safety, hygiene and quality. Any efforts to prevent packaging waste or further increase recycling or recovery rates must at the same time fully guarantee food safety and hygiene.

Packaging prevents waste and protects the environment

Packaging safeguards product integrity right at the various stages. While primary packaging, such as bottles and cans, contains the individual product at the point of purchase, secondary packaging groups a number of items together, for example in a box or other form of wrapping. Tertiary packaging (pallets or shrink-wraps) protects products from damage during transport and distribution.

Insufficient packaging undermines product integrity and results in more food waste, leading to significantly higher overall environmental impact, since all resources invested into the product are wasted (including agricultural inputs, water, energy, transport fuels and the packaging itself). In some developing countries where packaging does not exist, food wastage can exceed 50% before it even reaches the consumption stage, compared with between 2% and 4% in industrialised countries.

Packaging also improves the shelf-life of food and drink products, avoiding food waste at the retail and household stage, which currently accounts for a significant share of municipal solid waste (25-30%).

To put the issue in perspective, the environmental impact of avoidable household food waste is estimated to be at least eight times greater than the impact of total packaging waste going to landfill.

Reducing environmental impact of packaged goods throughout their life-cycle

Packaging represents around 5% of total waste generation in the EU. Packaging waste accounts for 17% of municipal waste by weight and between 20% and 30% by volume.

The food and drink industry is a major user of packaging and accounts for about two thirds of total EU packaging waste by weight.
New life-styles and demographic structures are driving important changes in the demand for different products and packaging types. The food and drink industry is responding to changing consumers’ needs and is adjusting its products and packaging accordingly.

Other sociological trends with relevance to packaging include better understanding and awareness of dietary and health issues among EU consumers. In this context, smaller portion sizes are one of several measures in the broader strategy to fight obesity.

Food and drink industry initiatives

It is a priority for the food and drink industry continuously to improve the environmental performance of packaging across the life-cycle. The industry has implemented a wide range of measures and initiatives to promote responsible packaging management including source reduction, re-use, recycling and recovery.

Major industry achievements at a glance

All recovery and recycling targets have been met

In 2002, all EU recovery and recycling targets applicable to EU-15 have been achieved. Specifically, out of a total of 66 million tonnes of packaging waste, around 36 million tonnes (54%) were recycled. Compared with 1997, this is an increase of 9 million tonnes and an increase in the recycling rate of 8% (Source: European Commission).

Packaging waste recycling and recovery have led to positive environmental effects

Significant greenhouse gas savings have been achieved amounting to around 25 million tonnes of CO2 equivalent. Resource savings total around 10 million tonnes of oil equivalent. This corresponds to around 0.6% of total EU-15 greenhouse gas emissions in 2002, or between a third and a half of total greenhouse gas emissions of countries like Denmark, Ireland or Sweden (Source: European Commission).

20% reduction in packaging waste sent for final disposal

Although packaging consumption in the EU is growing, packaging waste sent for final disposal fell by nearly 10% between 1997 and 2001 and by nearly 12% between 2001 and 2004 - an overall reduction of more than 20% (Source: http://ec.europa.eu/environment/waste/packaging/data.htm). Both achievements were due to the significant contribution of industry to the efficient functioning of national recovery and recycling schemes. Whereas the volume of packaging placed on the market is typically rising with growing GDP (although less markedly), efficient recycling and recovery ensure that embedded materials and energy find useful new applications within the economic cycle, thereby replacing virgin raw materials and resulting in lower environmental impacts.

Sociological and demographic trends strongly influence packaging

In addition to quality and safety requirements, new European life-styles and demographic structures, which lie outside the influence of the food industry, are driving important changes in the demand for different products and packaging types. The food and drink industry has an important responsibility to serve consumers’ needs, and must therefore take these changes into account and adjust products and packaging accordingly.

For example, most EU countries have a growing number of single person households. In Germany, for instance, 35.4% of people live alone (32.6% of households comprise only two people). This trend results in increased waste volumes per household, including packaging waste (see graph below).

At the same time, portion sizes tailored to the needs of single person households can play a crucial role in reducing food waste. The impact of increased packaging is thereby usually far out-weighted by the environmental benefits of preventing the loss of all resources invested in the food product over its life-cycle.

The volume of waste per person

A single person living alone produces more waste than a person living in a family-of-four household.

Source: INCPEN, Great Britain
Packaging waste recycling and recovery in the EU have led to positive environmental effects. Significant greenhouse gas savings have been achieved amounting to around 25 million tonnes of CO2 equivalent. Resource savings total around 10 million tonnes of oil equivalent. (European Commission, 2006)

In the following paragraphs, the efforts and achievements of the industry are explained in detail.

Packaging source reduction

The food and drink industry is working intensively to limit packaging volume and weight to the level necessary to maintain the required levels of safety, hygiene and acceptance of the packed product by the consumer. Industry efforts cover a range of different initiatives that span production, marketing, distribution, utilisation and disposal stages. They include:

- Redesigning packaging to minimise use of materials
- Reducing secondary and tertiary packaging
- Using different packaging materials to minimise the number of types used and to optimise combinations
- Using lighter material
- Distributing products in bulk, where practicable and without prejudice to food safety
- Using packaging eco-design
- Rationalising product ranges to reduce packaging
- Using recycled and recyclable packaging materials

Kraft - Eco Toolbox

In its effort to minimise product-packaging impacts, Kraft developed environmental design guidelines - Kraft Eco-Toolbox - to incorporate sustainability into every packaging design. Eco-Toolbox promotes weight minimisation and the use of materials that can be recovered after use through recycling, composting or conversion to energy. In addition, the guidelines encourage the maximum use of recycled material in product packaging, subject to applicable regulatory requirements and the need to ensure product safety. As an example Kraft analysed existing packaging and came up with single layer packaging for Milka chocolate bars. The change in wrapping cut packaging volume by 58%.

Coca-Cola

Packaging material reduction: Aluminium cans (12oz/355 ml), glass contour bottles (8oz) and PET bottles (2L) used today have been reduced by 33%, 57%, and 32% respectively since their original introduction. In 2005, the use of cutting-edge Ultra Glass technology eliminated the need for approximately 52,000 tons of glass globally - a CO2 reduction equivalent to planting 8,000 acres of trees. Coca-Cola also reduced global PET use by more than 10,000 tons via manufacturing and package redesign efforts.
Nestlé

Nestlé is committed to reducing the environmental impact of packaging, without jeopardising the safety and quality of its products. The company aims to develop safe and high-quality packaged foods using the most efficient and appropriate packaging available, while at the same time satisfying consumer requirements and expectations. As an example, Nestlé reduced the weight of packaging material used per litre of bottled water by 26% between 2002 and 2006.

To improve the environmental performance of packaging, the full life-cycle of packaged products has to be taken into account. This life-cycle approach helps to identify the most favourable environmental packaging solution. A minimum of packaging is crucial to protect the product from damage and contamination during transport, distribution, storage and consumption. Insufficient packaging leads to more food waste, resulting in significantly higher environmental impact. In addition, less primary packaging often requires more transport packaging to avoid product damage, which can lead to higher rather than lower environmental impact.

Unilever

By eliminating an outer carton from Unilever’s Knorr vegetable mix and creating a new shipping and display box, the company halved the packaging, resulting in 280 fewer pallets and six fewer trucks a year to transport the same quantity. Unilever is also working on other design changes and light-weighting. For instance, in The Netherlands, Calvé peanut butter jar packaging has been reduced by 23% through a combination of light-weighting and design change.

A food company tried to reduce the weight of its biscuit packaging. The biscuits were originally packed in a thin plastic bag and a cardboard box. The total weight of the primary package per kg/biscuits was 93.1g. The energy expenditure of packaging was 4.2MJ per kg/biscuits.

A shrink film with 2.0g weight/kg and 0.2MJ energy expenditure/kg was adequate for transport packaging. To achieve reduction at source and produce a lighter package, the film and carton system was replaced with a stronger plastic bag. The total weight of the primary package was now only 16.3g/kg biscuits.

At 1.3MJ/kg the energy expenditure was also much lower. However, this packaging required stronger transport packaging - a corrugated board box instead of shrink film. As a result, the total weight of the combination of consumer and transport packaging rose to 103.4g/kg biscuits instead of the original 95.1g. The total energy expenditure rose to a total of 5.4MJ/kg. In addition, there was a higher energy loss due to increased product wastage.

Source: Pro Europe, Effective Packaging Effective Prevention, 2004 Brochure
(For more information see http://www.pro-e.org/)

Limits to packaging weight reduction for biscuits

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Source: Pro Europe, Effective Packaging Effective Prevention, 2004 Brochure
(For more information see http://www.pro-e.org/)

Biscuit packaging

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<tbody>
<tr>
<td>5</td>
<td>2.0g</td>
<td>67.1g</td>
</tr>
<tr>
<td>4</td>
<td>93.1g</td>
<td>103.4g</td>
</tr>
<tr>
<td>3</td>
<td>95.1g/kg biscuits</td>
<td>5.4 MJ/kg</td>
</tr>
<tr>
<td>2</td>
<td>4.4 MJ/kg</td>
<td>16.3g</td>
</tr>
<tr>
<td>1</td>
<td>87.1g</td>
<td>130.1g</td>
</tr>
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</table>

* Cardboard carton 83.8g + plastic mg 9.3g
Source: Packforsk, Sweden
In 2002, all packaging and recycling targets under EU waste legislation applicable to EU-15 have been achieved. Since then, recycling and recovery has further intensified. Several EU Member States had already reached the new targets for 2008 by 2005. Industry’s contribution to the efficient functioning of packaging recovery schemes has been vital in achieving this success.

Recycling and recovery

In order to meet national and EU legislation, industry (with the support of authorities) has developed and financed packaging recovery schemes, which take over the take-back and recovery obligations under EU legislation. Considerable amounts of time, effort and money have been invested by industry to ensure the efficient functioning of these national schemes and to encourage consumer awareness. The food and drink industry is the main contributor to packaging and recovery schemes across Europe. Recovery and recycling schemes, many of which are using the Green Dot symbol, have been set up in 23 EU Member States and have proven highly successful in achieving impressive recycling and recovery rates. In 2005 more than 14.7 million tonnes of used packaging were recovered and recycled by these schemes in Europe.

In 2002, all the targets of the Packaging & Packaging Waste Directive (PPWD) applicable to EU-15 have been achieved. Out of the 66 million tonnes of packaging waste, around 36 million tonnes (or 54%) were recycled in 2002. Compared with 1997, this is an increase of 9 million tonnes and an uplift in the recycling rate of 8%. Moreover, recycling and recovery has been further intensified since 2002.

By 2005, recovery in the EU-25 reached 67%, and recycling reached 55%. In addition, several EU Member States had already reached their recycling and recovery targets for 2008 by 2005, pushing the average recovery rate within the EU-12 up to 75%. These results are clearly an indicator of excellent progress in terms of resource efficiency.

FOST Plus Belgium

Packaging recovery organisations, such as Green Dot schemes, have proven highly successful in achieving impressive recycling and recovery rates. In 2006, the Belgian scheme FOST Plus, for example, achieved a recycling rate of more than 90%.

Tonnage per group of products

<table>
<thead>
<tr>
<th>Tonnage %</th>
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<tbody>
<tr>
<td>Food 31.7%</td>
<td></td>
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<tr>
<td>Drinks 44.5%</td>
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</tr>
<tr>
<td>Others 17.7%</td>
<td></td>
</tr>
<tr>
<td>Hygiene &amp; beauty 3.0%</td>
<td></td>
</tr>
<tr>
<td>Cleaning &amp; maintenance 3.1%</td>
<td></td>
</tr>
</tbody>
</table>

Achieved recycling and recovery rates (2002, 2005) against targets for 2001 and 2008 under EU packaging law

Source: European Commission
Kellogg: Recycled material in cereal cartons

Before Kellogg’s even had an official environmental policy, the company used safe, efficient and environmentally sound manufacturing methods. In fact, the first box that rolled off Kellogg’s production line was made of completely recycled material. Kellogg’s is continually looking at ways to minimise the packaging needed for its products. Because of the company’s historic use of recycled fibre, Kellogg’s packaging includes the recycling symbol to communicate its environmental commitment.

Energy recovery

Energy recovery from packaging waste constitutes another important treatment option, depending on the packaging material and local circumstances. In particular, plastics contain a high energy content, which can be efficiently recovered in specialised installations.

Energy recovery from plastics
(Source: Plastics Europe)
- In 2005, 29% (i.e. 6.4 million tonnes) of the post-consumer plastics waste was recovered as energy in the EU-25 + Norway and Switzerland, up 3% points on 2004.
- An important part of plastics recovery is from packaging applications and municipal incinerators which remain the most common form of energy recovery.

Re-use

The food and drink industry makes use of re-usable packaging wherever it is the most sensible solution. 20% of food and drink packaging is re-useable. The overall environmental performance of re-usable packaging is dependent on a number of factors, such as transport distances and return rates which affect the number of uses. For long distance trips, recyclable packaging is generally a better environmental option due to reduced fuel use and CO2 emissions. A 2003 study assessing the environmental, economic and social costs of different beverage containers found that the internal costs of re-usable packaging (in particular for deposit management) were considerably higher than those of recyclable packaging*. The difference more than off-set any lower environmental impact of re-usable packaging for short trips. There is therefore no generally preferable system between these two types of packaging systems.

R&D, eco-innovation and packaging choice

The food and drink industry is working continuously with packaging material suppliers and converters, as well as other food chain partners, to develop innovative packaging solutions with reduced environmental impact. Further technical research and innovation are vital to overcome existing technical barriers. In order to ensure that new packaging innovations meet all relevant criteria, including the protection of product integrity, food safety and quality, but also consumer acceptance and reduced environmental impacts, it is essential that industry can draw on the full scope of available packaging types and materials to identify the option offering the best overall performance under given circumstances. Continued R&D and eco-innovation is therefore required for all different packaging types and materials. There is no single solution.

One interesting option, among many others, is to explore the technical potential of packaging made from renewable raw materials and to assess its overall environmental, social and economic performance. The use of these materials for packaging of food and drink products is particularly challenging due to a number of special demands, such as permeability, as well as mechanical properties and safety issues.
Action from other stakeholders

Consumers

Industry, retailers, consumer organisations and authorities share the responsibility to work together to raise consumer awareness and understanding of packaging reduction and recovery. Everyone must play their part in developing practical solutions to make it easier for consumers to contribute to re-use, recycling and recovery on a daily basis.

Internal market

The objective of ensuring environmentally responsible packaging management needs to be promoted in parallel with the objective of safe-guarding the proper functioning of the internal market. Therefore, Member States should not be allowed to introduce discriminatory national packaging measures, such as mandatory deposit systems and eco-taxes, which are not justified on environmental grounds and which hamper the proper functioning of the internal market and distort competition.

Recovery and Recycling Schemes

National recovery and recycling schemes for packaging waste have proven highly successful in achieving impressive recycling and recovery rates, and will play a key role in future packaging waste management. A key challenge lies in the translation of successful concepts from experienced Member States to all other Member States. Through mutual learning processes and stimulation, the aim is to ensure resource-efficient packaging waste management across all 27 EU Member States.

Nestlé: Packaging made from renewable resources

With the launch of new packaging for Nestlé Dairy Box and Black Magic in the UK in 2005, Nestlé has pioneered a new technology in Europe. The trays of both products have been made from renewable resources (maize starch) and provide the same level of safety and quality as the old trays, which were made from crude oil. Furthermore, the new trays require about 50% less energy along their entire lifecycle, from raw material production and transformation into packaging material through to disposal. They are bio-degradable and also dissolve in water. Nestlé Dairy Box won the Environmental category at the UK Packaging Awards 2006. Due to technical difficulties with the packaging, however, the new packaging had to be replaced temporarily with PET trays. Nestlé is nevertheless determined to reintroduce the trays again, as soon as possible. Nestlé’s worldwide R&D network is following developments in this technological area and is duly considering further relevant uses for this new type of packaging.

“... The food and drink industry is working continuously with packaging material suppliers and converters to develop innovative packaging solutions that contribute to improved sustainability. To this end, industry must be able to draw on the full scope of available packaging types and materials in order to identify the option offering the best overall performance under given circumstances.”
Transport & distribution

Moving to sustainable connections

THE ISSUE

- Transport impact is overwhelmingly in the areas of road congestion, damage to infrastructure and road accidents. There are also impacts on greenhouse gas emissions, air and noise pollution.

- Following the general trend, the food and drink industry has experienced an increase in transport operations over the past decades. This is driven by structural changes affecting global supply chains, including a shift towards fewer, more efficient production plants and distribution centres, as well as “just-in-time” delivery.

- Food transport sustainability depends on an integrated approach, based on environmental life-cycle thinking and an understanding of the wider social and economic implications. Simplified concepts that measure sustainability solely in terms of distance travelled are misleading and should be avoided.

- The industry pursues a range of initiatives to optimise transport efficiency and sustainability, such as inter-modality, lowering impacts of individual modes, investing in new technologies and cooperating with key supply chain partners.

- To achieve further improvements, all stakeholders including farmers, industry, the transport sector, retailers, consumers, public authorities and others must join in intensified action to address the challenges we face. The environmental impacts of food transport should be reduced through a combination of fewer and friendlier miles. As there is no single solution, all possibilities should be explored.
The challenge

Environmental impacts of transport

The food and drink industry recognises that transport has significant environmental and social impacts, especially in terms of road congestion, damage to infrastructure and road accidents. There are also impacts on greenhouse gas emissions, air and noise pollution. As one of the major economic sectors in Europe, the food and drink industry is understandably an important user of transport, in particular of heavy goods vehicles (HGV). In France, for instance, food transport represents around 28.8% of total industry transport (in tonne-kilometres). In the UK, it is estimated that food transport accounts for 25% of all HGV vehicle kilometres.

Structural trends in food transportation

Following the general trend in most sectors, the food and drink industry has experienced an increase in transport operations over past decades, both in volume and distance. This derives mainly from structural changes affecting supply chains in the global economy:

- Over the past decades, the food and drink industry has moved towards fewer, more efficient production centres, which reduce overall costs and improve resource efficiency.
- Regional distribution centres (linking factories with supermarkets) have been created, leading to increased use of HGVs.
- The industry is adapting to retailers’ growing expectations for “just-in-time” deliveries and fulfilling short term orders, which compromise its ability to transport more efficiently.
- Changes in life-styles and diets and the globalisation of the food supply base, have led to a demand for more products being available throughout the year.
- EU enlargement has increased community trade.

“Food miles”

While increased food transport obviously has an environmental impact, food miles per se do not serve as a valid indicator of sustainability, either in environmental or in broader sustainability terms, as shown in the 2005 AEA Technology Environment report “The Validity of Food Miles as an Indicator of Sustainable Development”. The links between transport and environmental, social and economic considerations are complex and involve a number of trade-offs. Food transport sustainability critically depends on an integrated approach, based on environmental life-cycle thinking and the consideration of all the social and economic implications of transport.

a) Transport in the overall environmental context

As demonstrated by Manchester Business School’s 2006 literature review on the “Environmental Impacts of Food Production and Consumption”, few studies cover the entire life-cycle of food and drink products and the evidence is relatively weak in terms of local sourcing leading to lower impact as a general rule. The reasons for this are quite varied, and include:

- Transport mode: The impact of food transport is very dependent on transport mode. For example, air transport has a high global warming impact per tonne carried, whereas sea transport is very efficient.
- Transport efficiency: There is a trade-off between transport distance, vehicle size and transport efficiency. The current system of food supply often involves large HGVs travelling long distances between suppliers and shops via centralised distribution centres. However, this system enables very efficient loading of vehicles, which reduces the impact per tonne of food.

- Efficiency in agriculture: Certain raw materials are grown more efficiently in distant climatic zones. For example, a case study in the UK showed that, apart from the summer months, it can be more sustainable (in energy efficiency terms) to import tomatoes from Spain than to produce them in heated greenhouses in the UK.
- Efficiency in processing: Food can sometimes be processed in a more environmentally friendly way in distant, more resource-efficient installations meaning that less energy and water is used and less waste produced.
The fish processing industry

Some European Member State governments are encouraging consumers to eat more fish. (The UK government’s advice is two portions per week.) Yet many local fisheries are over-exploited, so fish processors increasingly are turning to alternative sources further afield in order to broaden the species base and to spread catches in line with re-generation capacities of fishstocks. In this regard, fish sourcing is looked at in a global context, with the benefits of sustainable sourcing far out-weighing the downside of transport. Furthermore, processing of European sourced fish in China is often cited as an example of inefficiency in the supply chain. However, hand-processing methods, which are economically viable in China, mean yields are significantly higher than mechanical processing in Europe. One company has estimated that they need 2.4 million fewer cod fish per year as a result of this strategy.

Food and drink industry initiatives

Food and drink companies pursue a range of initiatives to optimise transport efficiency and reduce environmental impact and costs. These actions apply to upstream flows (from raw material source to factory) and downstream flows (from factory gate to customers).

Optimising the mix of transport modes

In the food and drink supply chain, raw materials and products get to market via a complex transport network of road, rail, sea, and a very small proportion of air links. It’s obvious that efficient and sustainable transport requires efficient transfer between these different modes. The food and drink industry has significant experience with inter-modality and is continuously exploring innovative solutions.

b) Transport in the wider sustainability context

In addition to environmental considerations, transport has to be seen in a wider context, taking account of the social and economic dimensions of sustainability, both in the EU and globally. Trade and thus transport is an inherent component of EU policy. It is essential to provide appropriate and sufficient food supplies throughout the EU market and offer increased consumer choice. Exports, as much as imports, are key to enhancing industry competitiveness. To develop and secure growth and jobs, not only in large companies but also in small and medium enterprises (SMEs), it is essential for industry to reach out to new markets. Moreover, sourcing raw materials and final products from non-EU countries, in particular developing countries, contributes to the development and long-term prosperity of local economies.

A transport concept focusing on transport distances alone would therefore seriously undermine some key EU policy objectives in terms of social and economic sustainability.

Food transport sustainability critically depends on an integrated approach, based on environmental life-cycle thinking and the consideration of all social and economic implications of transport.

Cadbury: Cocoa beans take short cut by sea to factory gate

Cadbury Schweppes’ “Purple Goes Green” initiative aims to reduce the company’s greenhouse gas emissions by 50% by 2020. One way they have reduced environmental impact in recent years is by changing the way in which cocoa beans are transported from Ghana to the UK. Prior to 2000 the beans were shipped to south-east England and then transported by road to the cocoa-processing factory at Chirk in North Wales. This involved 2,150 loads travelling over 500,000 miles. The beans are now shipped directly into Liverpool in north-west England (40 miles/60km from the processing plant). This has resulted in 1,600 loads travelling only 135,000 miles, thereby reducing environmental impact by 75%.

Danone: The first user of the Saône-Rhône river for container transport

River freight has been a significant part of the Danone supply chain for many years. In 2006 alone, it carried over 100 million bottles of mineral water. This figure has been growing at a rate of 10% a year. Containers are loaded in Macon and Lyon for the deep-sea port of FOS-Marseille. From there Danone supplies its customers around the world and especially in Japan. Two barges leave Macon every week and a third is added during the peak season for mineral water. By using the river, Danone keeps 5,000 trucks off the road each year.
Minimising the environmental impact of individual transport modes

Road transportation is the main source of CO2 emissions compared to other transport modes. In this context, consumers play an important role in terms of the vehicle-kilometres that their food travels. The AEA Technology Environment report showed that, in 2002 in the UK, domestic car journeys from shop to home accounted for 48% of UK food vehicle-kilometres and 40% of total social costs of UK transport. Concerning the industry’s share in overall food vehicle-kilometres, one of its key objectives in terms of ‘fewer’ miles is to minimise tonne-kilometres carried for a given volume of product. For instance, food and drink companies are mindful of the need to make use of spare capacity on the return leg of a delivery journey to reduce empty running, a practice known as back-loading. This is being addressed by companies either through their relations with third part hauliers – for those that contract out their transportation (as is the case for the majority of companies) – or through their own road transport optimisation programmes.

Transport rationalisation in the sugar industry

Efficient beet processing requires accurate control of enormous commodity flows, and continuous beet delivery to the factories. To minimise the traffic burden, the sugar industry has pursued a policy of transport rationalisation in order to reduce the environmental effects of beet transport. Beet farmers are encouraged, through targeted information and various handling improvements made in the factories, to deliver in large vehicles. This reduces the number of trips and thus results in fewer kilometres travelled, lower fuel consumption as well as less noise.

Food and drink manufacturers pursue a range of initiatives to optimise transport efficiency and sustainability, such as inter-modality, lowering impacts of individual modes, investing in new technologies and cooperating with key supply chain partners.
Building on achievements

Greater cooperation across the supply chain, bringing together food manufacturers, logistics providers, retailers and consumers, has the potential to achieve important further improvements in transport sustainability. In the specific context of the UK, the report of the Food Industry Sustainability Strategy (FISS) Champions’ Group on Food Transport published in May 2007 assessed that a 20% reduction in environmental and social costs associated with domestic transportation of food by the food industry was possible - without undermining the efficiency of the distribution network. However, it demands concentrated effort in six “big hitting” action areas, summarised in the table.

For the food and drink industry, where direct deliveries between manufacturers and shops are concerned, discussion with retailers to widen delivery windows is of particular importance. In fact, deliveries to retailers are mainly concentrated between 5 am and 10 am, when many people are commuting.

New technologies

The need to use state-of-the-art technology plays a key role in food and drink companies’ own transport fleets and in the choice of external transport logistics providers. The industry supports the introduction of new engine norms (EURO IV, V) and chooses its logistics providers according to their compliance with EU norms.

Nestlé

Nestlé NWDi Poland has two producers of trucks: IVECO and Renault. Old vehicles are replaced every 5-6 years. This guarantees new technology (e.g. updated engines, Euro 3, 4, 5) and reduction of emissions. Trucks are regularly maintained, which prevents unexpected pollution. There have been 6 IVECO Daily 65C12G in operation in Poland (Warsaw depot) since 2004, functioning with 3-way catalytic converters to reduce gas emissions (CO, HC, CH4 and NOx emissions). In addition the “CNG power unit” greatly improves urban transport sustainability by lowering emissions of micro particules (PM 10).

The ECR Project for collaborative management of transport across the supply chain

A number of large food and drink companies, together with major retailers, service providers and other consumer goods manufacturers, have joined forces to set up the ECR initiative (“Efficient Consumer Response”). The European Transport Optimisation project, one of ECR’s projects, was launched in late 1997 to develop guidelines to optimise transport efficiency in economic, social and environmental terms. The team estimates that comprehensive implementation of the principles outlined in the report would enable the European economy to reduce vehicle movements by up to 30%, or to absorb up to 30% growth in business freight tonne-kilometres, without any increase in current levels of goods vehicle movements.

Six “big hitting” action areas for food transport sustainability under the UK FISS

<table>
<thead>
<tr>
<th>Action</th>
<th>Main Potential CO2 impact saving (%)</th>
<th>CO2 reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater capacity vehicles</td>
<td>Fewer 5.3</td>
<td>6.5</td>
</tr>
<tr>
<td>Out of hours deliveries</td>
<td>Friendlier 2.0</td>
<td>0</td>
</tr>
<tr>
<td>Engine specifications</td>
<td>Friendlier 3.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Vehicles telematics/CVRS</td>
<td>Fewer 3.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Transport collaboration</td>
<td>Fewer 3.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Logistics systems redesign</td>
<td>Fewer 2.3</td>
<td>2.8</td>
</tr>
<tr>
<td>TOTAL BOTH</td>
<td>17.3</td>
<td>14.2</td>
</tr>
</tbody>
</table>

Source: Faber Maunsell (2007, p.43 Tables 26 & 27)
Alternative fuels/bio-fuels

Renewable energy sources, including bio-fuels, can contribute to addressing a three-fold objective: improving security of energy supply through the diversification of energy and feed-stock sources; helping to tackle climate change; and enhancing the competitiveness of EU-based companies.

However it is essential to ensure that the global costs related to EU bio-fuels policies do not outweigh their benefits and trigger serious environmental problems (e.g. deforestation, water depletion) and social and economic problems, including food shortages and global price rises.

In future, agricultural markets will face increasing demand from rapidly expanding economies in Asia and Latin America. The bio-fuel development envisaged in many countries over the next 10 to 20 years will add to existing pressure on agricultural markets and is likely to contribute to rising global food commodity prices. Also potential environmental impacts triggered by an increasing demand for bio-fuel crops need to be considered carefully. This assessment is echoed by the 2007 OECD report on bio-fuels (Roundtable on Sustainable Development) concluding that the rush to energy crops could cause food shortages and damage to bio-diversity, and bring limited benefits.

The EU bio-fuels policy must therefore take an integrated sustainability approach, considering life-cycle environmental impacts as well as food security and other social and economic impacts. Particular urgency must be given to the earliest possible development of second-generation bio-fuels, which put less pressure on global eco-systems and food security.

Action from other stakeholders

Road to rail/ship

CIAA considers that the road to rail or ship modal shift also has great potential to deliver “friendlier” miles for the industry. However it requires efficient infrastructure, in particular more high-quality and efficient rail services (in terms of reliability, punctuality as well as cross-border speed and inter-operability between national railway systems). Uptake by the food industry is also currently hampered by a lack of communication about possible synergies, networks, back-loading opportunities and a general lack of flexibility amongst the rail freight industry. Further harmonisation of inter-modal unit loads and development of inter-modal terminals is also essential. Whilst the food and drink industry welcomes recent initiatives to improve infrastructures for alternative modes of transport at national level, it calls for more pan-European work to look at the existing barriers to achieving greater modal shift and how these might be overcome.
Consumers

Their role in environmental sustainability

THE ISSUE

- Consumers generate significant direct environmental impacts in the way they transport, store and prepare food, and the amount of waste they create and how they dispose of it.

- In addition, consumers indirectly influence impacts upstream in the supply chain through their purchasing decisions. Consumer demand for different food products has changed significantly over the last 30 years, driven by increasing per capita incomes, demographic shifts and life-style changes. These factors have also altered the environmental characteristics of food products.

- Consumption-related measures can help consumers to reduce their own environmental impacts by raising their awareness of the consequences of their actions and decisions. Measures can also make it easier for them to reduce energy consumption and to contribute to waste prevention and recovery. Environmental information can encourage consumers to consider the wider sustainability implications across the food chain.
The challenge

Households’ direct environmental impact

CO2 from shopping by car

The rapid increase in the number of hypermarkets and food shops, often located outside towns, has increased the amount of transport miles for household food shopping. To reduce CO2 emissions from shopping by car, the challenge for the consumer is to use more efficient engines and cleaner fuels, and, wherever possible, to change to alternative transport and/or delivery modes (e.g. use of supermarkets’ delivery services).

Energy use for food storage and preparation

The use of energy for food-related activities is a notable contributor to overall GHG emissions in the food chain (about 15%). Recent research indicates, for example, that food storage, preparation and dishwashing account for about 38.5% of the electricity used in the life-cycle of meat and dairy products. This compares with a share of 18% for manufacturing. Household electricity consumption has continued to grow, largely due to expanding household ownership of appliances, including food-related appliances (refrigerators, freezers, dishwashers, microwaves). There is still significant potential for improved energy efficiency of appliances, and for consumers to apply more energy-efficient food-preparation techniques.

Electricity consumption along the meat and dairy life-cycle

As % of total consumption for meat and dairy products (Household electricity use covers food storage, cooking and dishwashing)

- Food industry 18%
- Farming 7%
- Others 24%
- Catering 6.5%
- Retail 6%
- Households 38.5%

Source: IMPRO study, Draft final report, 2007

Generation of food waste

Food waste generation in households is particularly worrying from an environmental perspective as it results in the loss of all resources invested in the product over its entire life-cycle (agricultural inputs, water, energy, packaging, transport, cooling, etc.). Recent research indicates that up to 30% of food is wasted in households (half is edible food). In addition to the unnecessary loss of natural resources, inappropriate disposal of household food waste generates additional environmental impacts. Composting household food waste is often still under-developed and a significant part ends in landfill, where it generates the greenhouse gas methane. Prevention of household food waste is therefore fundamental in ensuring sustainability in the food chain.

Food waste in households (based on UK estimates, WRAP)

- Consumed food 70%
- Household food waste 30%
- Edible 15%
- Non-edible 15%

Packaging waste

Consumers play an essential role in ensuring the successful functioning of national re-use, recycling and recovery schemes for packaging and packaging waste. Consumers’ efforts have been crucial in achieving continuously rising recycling and recovery rates in the EU. Besides environmental education, it is important to make it easy for consumers to separate, collect and dispose of their waste correctly in their everyday life (see the chapter on packaging).

Food and drink industry initiatives

Food waste: Tailoring product and packaging design to consumers’ needs

The food and drink industry’s efforts in developing tailor-made packaging solutions, including adjusted portion sizes, protection from physical damage and shelf-life improvements, have helped greatly to reduce food waste from spoilage during transportation and storage. When smaller portion sizes (particularly for the rising number of single households) lead to a rise in packaging, this increase is usually far outweighed by the environmental benefits of preventing food waste. This is simply because the manufacture of the food or drink product itself is far more resource intensive than that of the packaging, which is also subject to highly effective recycling and recovery. Adjusting packaging design to changing consumers’ needs will therefore remain a priority for food and drink companies.
Building on achievements

1. Households’ direct impact

**Household food waste**

As highlighted in recent studies (e.g. the IMPRO draft final report on meat and dairy products), the most immediate household-related challenge is to reduce food waste.

- The greatest potential to reduce food waste lies in improved shopping and household planning. Consumers are often unaware of the environmental impact of food waste generation, and do not consider this aspect in their shopping decisions.
- Cooperative action is required by private and public stakeholders to support consumers in developing easily applicable strategies to match their daily food purchases with their actual needs. Improving the knowledge-base on consumer shopping patterns (e.g. frequencies and volumes of purchases) will help to identify the main motives for insufficient planning.
- The food industry will continue to explore opportunities to adapt product and packaging design to changing demographic requirements and purchasing trends (e.g. single households, rising dietary awareness) in order to avoid unnecessary food waste.
- Where household food waste cannot be prevented, increased attention has to be paid to environmentally sound management of this waste stream (e.g. bio-gas and composting).

2. Environmental information

**Food storage and preparation**

Cooperation among stakeholders is needed to support consumers in saving energy and water in daily food storage and preparation, for example by providing detailed information on the most efficient food preparation techniques. Changing to more energy-efficient household appliances (fridges, freezers, cookers and stoves) will be another important contributor.

**Packaging recovery organisations support active citizenship for sustainable development**

Since 2000, Ecoplasts (the Green Dot system in Spain) has been cooperating with Ecovidrio, Ministry for the Environment, APAS (Association for the Promotion of Socio-Cultural Activities) and the Foundation for Biodiversity to develop didactic education materials for teachers and schoolchildren between the ages of eight and twelve. The environmental guides focus on sorting, recycling and re-use of packaging and packaging waste. 1,600 schools and around 170,000 children are currently using the materials. Ecomelalajes also supports the “Values from Aldeas Infantiles S.O.S.” school programme that is run by the foundation of the same name. A teaching unit on the subject of waste separation and recycling was developed and distributed to 3,750 schools. At the end of 2004, a total of around 257,000 children aged between six and twelve were taught this subject for one month.

“Household food waste is particularly worrying from an environmental perspective as it results in the loss of all resources invested in the product over its entire life-cycle.”

Consumers
Reliable and meaningful environmental information enables consumers to consider the wider sustainability implications of their purchasing decisions.

The European food and drink industry is actively engaged in a number of concrete initiatives aimed at evaluating the feasibility of developing a uniform, integrated and reliable environmental assessment methodology for food and drink products, to evaluate corresponding costs and benefits and to explore suitable communication.

Developing reliable and meaningful assessment methods

In the last few years, businesses and public authorities have engaged in intensified efforts to develop meaningful environmental assessment methods, covering the entire lifecycle of products, and to communicate this information along the supply chain and to the consumer. In the food and drink industry, environmental supply chain analysis is an important management tool to cut resource consumption, emissions and costs. The food and drink industry also supports the provision of environmental information to consumers, on the following conditions:

- Information must be credible and science-based.
- To be meaningful, the information must cover all major environmental impacts along the life-cycle.
- Information must be understandable and must not confuse or mislead the consumer.
- To avoid any consumer misinformation, verification is crucial.
- To avoid distortion of information, applied assessment methodologies should be uniform.
- Information must be effective and efficient, i.e. it has to contribute to environmental improvement in a cost-efficient manner.
- Besides labelling, there is a range of other tools to inform consumers of the environmental performance of products. The suitability of all available tools should be explored.

Example 1:
In the UK, the pack of the brand “Innocent” (fruit smoothies) refers to a website providing information on the carbon footprint of the product.

Example 2:
The pack of the brand “Nescafé - Partner’s Blend” refers to a website providing information on how Nescafé’s supply chain management supports farmers, their communities and the environment.

Example 3:
In the UK, the brand “Walkers - Cheese & Onion Crisps” carries a carbon label on pack.
Conclusion

This publication demonstrates that the European food and drink industry is making significant and continuous improvement towards environmental sustainability. It also shows that there is considerable scope to build on these achievements.

As we have said, given the complexity of the food chain, there is no single solution. Every player in the chain has a crucial role, individually but also as a team player. It is by working together that we can achieve even more striking long-term results.

This publication has highlighted key issues and identified areas for future work by all stakeholders. And we send the same invitation as we did at the beginning of this communication: the CIAA welcomes your contributions.

Together, right across the food chain, we can achieve much more. The whole is greater than the sum of the parts.

We look forward to hearing from you.
Be inspired...

The case studies and examples selected for this report illustrate how different companies in the food and drink industry are addressing various sustainability challenges. They give an idea of the breadth and depth of the industry’s efforts.

The examples emanate from a highly diversified industry with a multitude of different raw materials, products, processes and activities. They represent a very diverse range of interests and activities from companies, organisations and federations in a multitude of sub-sectors. They also depend on different local environmental and economic conditions.

In this context, it would be inappropriate to use these practices as benchmarks either for the entire industry or for sub-sectors. Nevertheless, we hope that they will be a source of inspiration for other food and drink companies.

Take a closer look

For more case studies and examples, please visit:
http://envi.ciaa.eu

Endnotes


(3) Two other considerations indicate the validity of this estimate. The EU manufacturing sector accounts for 28% of final energy use and for about 16.5% of all GHG emissions in the EU-15 (energy-use related emissions, not including process emissions). Food manufacturing accounts for about 7% of final industrial energy use, thus for about 1.15% of total GHG emissions. As process emissions in the food industry are very low, the sector’s overall share in EU-15 GHG emissions could be estimated at about 1.2% on the basis of this calculation. This compares with estimates by the UK Defra, suggesting that national food manufacturing accounts for about 1.8% of total UK GHG emissions (the sector’s share differs according to size and structure of the national food industry). The above share of 1.5% can thus be considered as a sensible average estimate for the food and drink industry at European level.

(4) European Environment Agency (WQ2) and New Cronos (Eurostat-OECD JQ2002), Water use by sectors, scope: EU-27 + Turkey, Norway and Switzerland (May 2004)

(5) Idem

(6) G Pre, Packaging of food products - its role and requirements, Packaging India, 30/1, 9-11 (1997)


(8) RDC and PIRA, Evaluation of costs and benefits for the achievements of reuse and recycling targets for the different packaging materials in the frame of the packaging and packaging waste directive 94/62/EC (2003)

(9) Faber Maunsell, Reducing the External Costs of the Domestic Transportation of Food by the Food Industry (2007)

(10) See also: Lincoln University, Comparative Energy/Emissions Performance of New Zealand’s Agriculture (2006)

(11) Schlich and Fleissner (2003) found that large-scale orange juice processing and shipment from Brazil is more energy-efficient than procuring apple juice from small local producers in Germany, in Environmental Impacts of Food Production and Consumption, Manchester Business School, p. 47 (December 2006)

(12) For instance, 95% of food and drink companies’ transport operations are contracted out to third party hauliers in the UK


Europe’s number one manufacturing industry
13% of total EU manufacturing production value
11% of jobs in manufacturing
Dominated by small and medium sized enterprises: 99% of food companies have fewer than 250 employees
More than 280,000 companies
€836 billion in annual sales
Around 3.8 million employees
Purchases and transforms 70% of European agricultural raw materials
€48 billion a year in exports

At a glance:
The EU-25 food and drink industry

Structure of the food and drink industry

**The leading industrial sector in the EU**
- With a turnover reaching €836 billion, the food and drink industry is the largest manufacturing industry in the EU, ahead of the automobile and chemical industries.
- The food and drink industry is the leading employer in the manufacturing sector with 3.8 million employees in 282,600 companies.
- France, Germany, Italy, the UK and Spain are the leading producers of food and drinks in the EU, accounting for about 70% of total EU turnover.

**SMEs in the food and drink industry**
- The food and drink industry is composed of a diverse range of companies from SMEs (small and medium-sized enterprises defined as having less than 249 employees) to large companies.
- SMEs make up 99.1% of the food and drink business population. These 282,600 companies generate 47.8% of food and drink turnover and employ 61.3% of the sector workforce.
- Large companies account for just 0.9% of all food and drink enterprises but they provide 52.2% of turnover, 53.8% of added value and contribute to 38.7% of employment.

**A highly diverse and fragmented sector**
- The food and drink industry is characterised by a very high diversity of different products and production processes.
- The “various food products” category is the largest sector of the food and drink industry; it accounts for 26% of total turnover and 42% of work-force. This so-called “various food products” category is a heterogeneous group which includes bakery, pastry, chocolate and confectionery products but also pasta and baby food.
- Meat, beverages and dairy products are also key sectors and, together with “various food products”, they represent 77% of total turnover and 84% of the total number of employees.

### Distribution of turnover and employment in sub-sectors

<table>
<thead>
<tr>
<th>Turnover (%)</th>
<th>Employment (%)</th>
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<tr>
<td>26.0</td>
<td>41.3</td>
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<tr>
<td>15.5</td>
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<td>15.3</td>
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<td>1.9</td>
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<td>0.9</td>
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<tr>
<td>0.4</td>
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- Grain mill products and starch products
- Animal feeds
- Beverages
- Various food products

Source: Eurostat, SBS, 2003 data
<table>
<thead>
<tr>
<th>National Federations</th>
<th>Sectors</th>
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<tbody>
<tr>
<td>Austria</td>
<td>Bakery</td>
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<tr>
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<td>Bottled waters</td>
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<td>Breakfast cereal</td>
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<tr>
<td>Finland</td>
<td>Broth &amp; soup</td>
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<tr>
<td>France</td>
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<td>Greece</td>
<td>Fruit &amp; vegetable juices</td>
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<td>Fruit &amp; vegetable preserves</td>
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<tr>
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<td>Ice cream</td>
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<tr>
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<td>Intermediate products for bakery &amp; confectionery</td>
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<td>Pasta</td>
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Acknowledgement:

CIAA would like to thank all the members whose input, comments, experience and case studies have contributed to this publication.
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